DOCUMENT RESUME

SE 022 819

ED 142 431

TITLE	Environmental Studies Center Teacher Books. 4th Grade - Mangrove Communities.
INSTITUTION	Martin County Schools, Jensen Beach, Fla. Environmental Studies Center.
PUB DATE	76
NOTE	76p.; For related documents, see SE 022 815-823; Not available in hard copy due to marginal legibility of original document
AVAILABLE FROM	Environmental Studies Center, 2900 NE Indian River Dr., Jensen Beach, Florida 33457 ($2.50; all 9 books $20.00)
EDRS PRICE	MF-$0.83 Plus Postage. HC Not Available from EDRS.
DESCRIPTORS	Curriculum Development; *Ecology; Elementary Education; *Elementary Grades; *Environmental Education; Grade 4; Instructional Materials; Learning Activities; Nature Centers; *Oceanology; Outdoor Education; *Teaching Guides
IDENTIFIERS	*Estuaries; Florida

ABSTRACT

This teacher's guide, one of nine teacher packages developed for use in the sequential, hands-on, field-oriented, K-8 environmental education program of the Martin County Schools in Florida, was developed for use with elementary children in grade four prior to and after a visit to an environmental studies center located near an estuarine area. The grade four program centers around the theme of "Mangrove Communities" and includes fact-finding about mangroves, data collection and interpretation, and food chain construction. This guide contains teacher instructions, scripts, tests with answer keys, and a copy of all student materials. Slide/tape programs and 8 mm film loops are not included. General and specific program objectives are stated and a program outline, including learning activities to be completed at the school and environmental studies center, is detailed. (BT)

****
* Documents acquired by ERIC include many informal unpublished *
* materials not available from other sources. ERIC makes every effort *
* to obtain the best copy available. Nevertheless, items of marginal *
* reproducibility are often encountered and this affects the quality *
* of the microfiche and hardcopy reproductions ERIC makes available *
* via the ERIC Document Reproduction Service (EDRS). EDRS is not *
* responsible for the quality of the original document. Reproductions *
* supplied by EDRS are the best that can be made from the original. *
****

ED142431

U S DEPARTMENT OF HEALTH,
EDUCATION & WELFARE
NATIONAL INSTITUTE OF
EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

4th Grade

Mangrove Communities

PERMISSION TO REPRODUCE THIS COPYRIGHTED MATERIAL HAS BEEN GRANTED BY

Jay Jarrett

TO ERIC AND ORGANIZATIONS OPERATING UNDER AGREEMENTS WITH THE NATIONAL INSTITUTE OF EDUCATION. FURTHER REPRODUCTION OUTSIDE THE ERIC SYSTEM REQUIRES PERMISSION OF THE COPYRIGHT OWNER

SE 022 819

Martin County Schools'
ENVIRONMENTAL STUDIES CENTER
2900 NE Indian River Drive, Jensen Beach, Florida 33457

TABLE OF CONTENTS AND CHECKLIST

This packet contains teacher instructions, scripts, test and answer key and a copy of all student materials.

We suggest you cover these materials in the order listed in this packet.

In parenthesis after each item is the quantity you will need for your class and whether it is expendable or to be returned.

* Also listed but not included in this booklet are items such as flash cards, slide/tapes, feltboard and pieces, etc.

CONTENTS:

1. Program Summary
2. Teacher Instructions
3. Center Activities
4. "Mangrove Communities" teacher supplement
5. Script for slide program, "Vocabulary"
* 6. Slide/tape program, "Vocabulary"
7. "Organisms of the Mangrove Community" student booklet (one for each student - to be returned)
8. "Mangrove Community" student booklet (one for each student - to be returned)
9. "The Mysterious Mangroves" student booklet (one for each student - to be returned)
10. "Food Chains" student booklet (one for each student - to be returned
11. "Mangrove Community Food Chains" student booklet (one for each student - to be returned)
12. "Student Activities Booklet" (one for each student - expendable)
13. Data sheets (will be furnished at the Center visit)
14. Student test (one for each student - to be returned)
15. Test answer sheet with key (one set for each student - expendable)

FOURTH GRADE PROGRAM SUMMARY

GENERAL OBJECTIVE: To acquaint the student with a mangrove community and provide him evidence that he is an integral part of it resulting in his successful completion of the performance activities for the specific objectives.

SPECIFIC OBJECTIVES: The student will on the test;

1. demonstrate with 70% proficiency knowledge of physical and biological factors related to the mangrove communities when given questions pertaining to these factors and a choice of possible answers;
2. demonstrate with 80% proficiency knowledge of food chain concepts and construction when given a question pertaining to food chain concepts and a choice of possible answers, when given an incomplete food chain with possible organisms to complete it, by constructing an accurate food chain when given a list of plants and animals, and when given a list of plants and animals selecting the correct one of possible permutations;
3. demonstrate with 80% proficiency knowledge of selected vocabulary words when given a definition and a choice of words to match with the definition;
4. identify with 80% proficiency organisms and characteristics of selected organisms found in the mangrove community when given pictorial representations of organisms and choice of names and/or a characteristic and choice of organisms.

PROGRAM OUTLINE:

A. Activities at home school (two to three weeks)

1. Two "Food Chain" booklets
2. Slide/tape program - vocabulary
3. Two "Mangrove Organisms" booklets
4. Three 8mm film loops about mangroves
5. "Mysterious Mangroves" booklet
6. Demonstration of hydrometer kit
7. Activities booklet - crossword puzzles, pencil games, etc.
8. (Visit to Center)
9. Follow-up discussion
10. Post-test

B. Activities at Center (4-5 hours)

1. Mangrove study - students are taken to an area where red, black and white mangroves are found where they will collect information and record on their data sheets.
2. Measurement - students measure the general conditions of the area, e.g.- temperature of the soil, water and air.
3. Algae collection - students find various forms of algae and collect representative samples of each kind for further study back at the Center.
4. Food chain - student groups spend time discussing the formation of food chains and construct food chains using animals and plants found in their mangrove field experience.

5. Algae mounts - students study the various forms of algae collected in the field. Then they mount and press the specimens for future reference.
6. Discussion groups - students review data collected in the field and discuss ecological concepts related to these data.
7. Books and magazines - students may look through various publications on ecology.
8. Museum and Wet Lab - students view aquariums and observe the variety of animals and plants found in local mangrove communities.

FOURTH GRADE TEACHER INSTRUCTIONS

INTRODUCTION: The Fourth Grade program is a logical extension of the grassflat program produced by the Environmental Studies Center for Third Grade. There are four units presented in booklet form, slide/tape or both. To accompany this material there are film loops and a "Student Activities Booklet" for the various units. It is suggested that the units be presented in the order in which they appear in these instructions (vocabulary, organisms, mangrove community, and food chains).

During the Fourth Grade program the students will be investigating the mangrove swamps. Their activities will take them from the classroom to the mangroves themselves and to the Environmental Center.

If we can be of assistance to you in the successful presentation of this material, do not hesitate to call us.

PROGRAM AND MATERIALS

Unit I: Vocabulary

The vocabulary unit, along with a short introduction, is a slide/tape presentation.

To start the show, set up projector and tape player and project the first slide (focus) and start the tape. There will be an audible beep to indicate a slide change.

All vocabulary words are given with the phonetic spelling and are listed in the back of this booklet. This may be of help in working this unit into a Language Arts project.

In the "Student's Activities Booklet" there is a crossword puzzle and a word search to supplement the "Vocabulary Unit".

Unit II: Organisms of the Mangrove Community

If this is a new area to you, prepare first by reading the teacher supplement: "Mangrove Communities". It will give you a background.

The materials covering this unit are two booklets.

The "Mangrove Community" (orange booklet) gives a short description of the organisms in the unit, where they are found and usually what they eat.

The other booklet, the "Mangrove Community" (green booklet) gives the location on the Red Mangroves where many of these organisms live.

In the "Student Activities Booklet" there are the following activities to supplement this unit: "Organism Scramble Game", "Guess Who I Am", crossword puzzle, word search.

The film loop, "Mangrove Swamp: Food Web" also shows many of the same organisms. However it is recommended that this film be shown with the "Food Chain Unit".

There is a film loop on plankton included in this unit. Even though plankton is not a Fourth Grade organism a discussion about plankton would not be inappropriate. Many of the animals found in plankton are larval forms of larger animals in the organism unit. Plankton is also an important link in the marine food chain.

Unit III: The Mangrove Unit

The Mangrove Unit is a short story, "The Mysterious Mangroves". It is the adventure of three young children in a mangrove swamp.

This story is intended to tie the first two units together and prepare for the discussion of the Food Chain Unit.

Included also is a film loop entitled "Mangrove Swamps: Succession" which shows the usual growing patterns in the mangrove swamp. Please see the notes on film box.

Unit IV: Food Chain Unit

The Food Chain Unit also consists of two units. A booklet "Food Chains" introduces the idea of the food chains. The booklet "Mangrove Community Food Chain" develops the food chain concept using the animals of the mangroves.

The film loop "Mangrove Swamp: Food Web", is an excellent film showing a food chain in the mangroves. Please see the notes on the film box.

There is a food chain activity in the Student Activities Booklet.

. . . .

This concludes the classroom Pre-Activities. You should now be fully prepared for a visit to the Environmental Studies Center. Please let us know which activities were/were not successful, and what activities of your own you may have added. After your visit to the Center we suggest at least one day of review before giving the test.

TEST

To post-test your student for your records, copies of the test and answers are included. The test is to be given after your student visit the Center. The test mean for 1974-75 Fourth Grade students completing a full program was 67.0.

FOURTH GRADE CENTER ACTIVITIES

4 TO 5 HOURS

I. INTRODUCTION

Students are given an introduction to the Environmental Studies Center and an overview of the day's activities. Topics include:

1. Mangrove communities
2. Data sheets to be used in the field
3. How the equipment is used
4. Outlines of the various field and Center activities
5. Safety rules and regulations

II. MANGROVE STUDY

Students are taken to an area where red, black and white mangroves are found. They observe the location of each type of mangrove and record on their data sheets. They also note and collect organisms found on and around the different types of mangroves. Students also record temperature of air, water and soil and make observations on general conditions and plant and animal life in the area. They bring back to the Center samples of leaves, detritus, etc. and representative forms of algae found in the area.

III. CLEAN UP AND LUNCH

After returning to the Center students are asked to help clean up the equipment and other materials used in the field experience. The students themselves are hosed down and given a chance to change into dry clothes and use the restroom facilities.

Rooms are available in which students may eat lunch; however if the weather is nice why not have a picnic on the patio? Frisbees, checkers and hopscotch are available for after lunch activities.

IV. FOOD CHAINS

A general discussion of food chains is held and students practice forming food chains using organisms found in the mangrove area.

V. ALGAE MOUNTS

A discussion is held on the importance of algae in an aquatic ecosystem and the various functions algae have in the web of life. A representative sample of red, green, and brown algae is taken by each student and mounted on a 5 x 7 card. These are then put into a plant press and dried for several days. After the mounts are dry they are sent to the home school for distribution to the students.

VI. DISCUSSION GROUPS

Discussion is held on the mangrove community and how data collected by the students helps show the relationships found there.

VII. MUSEUM AND WET LAB

Students tour the Center and view aquariums, tanks and displays related to local mangrove communities.

MANGROVE COMMUNITIES

The word mangrove may be used to describe an individual plant species or an association of plants found in the marine intertidal environment. The word mangrove is a combination of the Portuguese "mangue" and the English "grove". If used to describe an individual plant species the word is usually prefaced by a descriptive adjective such as red mangrove or black mangrove. When used to describe an association of plants it generally refers to a group of flowering, seed-bearing trees growing in or closely associated with the marine intertidal zone. This association is sometimes called a tidal woodland.

Mangroves are found mostly in the tropics; although some are found in temperate zones where favorable currents and temperatures exist. Characteristically, mangroves grow in quiet lagoons or estuaries. Since mangroves grow only in the intertidal zone or in close association with the intertidal zone, the tidal range influences the amount of mangrove vegetation. Where the tidal range is wide mangroves form broad zones of swamp-like vegetation but are restricted where the tidal range is reduced. Because of this association with the tides, mangroves may be used as an indication of the high water line along the shore of an estuary or lagoon.

In Florida two distinct types of communities are found in the intertidal zone of the estuaries and lagoons. In northern Florida the intertidal zone is characterized by the salt marsh community composed of Spartina or cordgrass and Juncus or black rush. South of Cedar Key on the west coast and Daytona Beach on the east coast the salt marsh gives way to the mangrove swamp. In Martin County most of the natural shoreline of the Indian River lagoon is covered by mangrove thickets. In the intertidal zone of some of the spoil islands in the Indian River lagoon cordgrass may still be found, but it is slowly being replaced by young mangroves.

Although over thirty species of plants may be classified as mangrove, only three types of mangroves are commonly found in the south Florida area: the red mangrove (Rhizophora mangle) characterized by long prop roots which extend from the branches of the tree down into the water; the black mangrove (Avicennia germinans) characterized by a darker bark and pneumatophores (finger-like roots) which stick up out of the soil around the base of the tree; and the white mangrove (Laguncularia racemosa) characterized by shorter pneumatophores than the black mangrove and oval leaves with notches in the tips of the leaves. These trees are commonly found in a succession with the red mangrove growing in the lower tidal areas, black mangrove growing in the higher tidal areas, and the white mangrove growing landward from the red and black.

The role of the mangrove in the estuarine or lagoon ecosystem is varied and extensive. The mangrove serves as the dominant primary producer, land builder and water retainer, and home for many plants and animals.

As a primary producer the mangrove serves as the base of the food chain for many of the animals found in the Indian River lagoon. By process of photosynthesis the sun's energy is stored in the mangrove leaf. This is the first step of the energy flow in the food chain for most animals found in the estuary or lagoon. The leaf debris, detritus, is eaten by small crabs, shrimp, copepods, larvae, and plankton which are in turn eaten by larger organisms. This detritus also serves as food for bacteria and other microorganisms which are capable of breaking down cellulose and converting it into protein. The leaf litter from the mangrove has been shown to be as much as three or four tons per acre per year. This is much more than most land ecosystems found throughout the world.

The prop roots and pneumatophores of the mangrove trap debris which eventually builds up the land. They also serve as a buffer against waves which would erode the land. Thus an island in the lagoon might eventually be eroded away by wave action if it did not have mangroves growing on its shore. Also, an island with mangroves on its shoreline could possibly grow larger due to mangrove protection from waves and entrapment of debris. The pneumatophores and prop roots also keep water runoff from rains from eroding the shoreline by slowing down the rate of water flow and trapping soil which would be lost to the river.

As a habitat for plants and animals the mangrove thicket serves water-dwelling and air-dwelling organisms. The prop roots and pneumatophores give protection and serve as a nursery for many young forms of fish and other water dwelling animals. They also serve as a place for attachment for algae, oysters, barnacles, sea anemones, sponges, and other sessile organisms. Many water birds use the mangrove thicket for rookeries. In the Indian River lagoon many spoil islands covered with mangroves can be seen with pelicans, cormorants, and egrets roosting in their branches.

Martin County Schools'
Environmental Studies Center
2900 N.E. Indian River Drive
Jensen Beach, Florida 33457

4th Grade Slide Presentation

"Vocabulary"

TEACHER - Turn on projector on to "Focus" slide. Turn on tape player. Advance slides at the audible tone (or, if you are reading this narration, as indicated by the asterisk (*). Narration in CAPITAL letters.

1. "Focus" *

2. "Credits" slide *

3. "This is Environmental Studies Unit on Mangrove Community" *

   DURING YOUR WORK IN THE MANGROVES THIS YEAR, YOU WILL SEE AND DO SOME INTERESTING ACTIVITIES CONNECTED WITH THE MANGROVES. MUCH OF YOUR WORK WILL BE DONE RIGHT AT YOUR OWN SCHOOL. THERE WILL BE FOUR MAIN UNITS ALONG WITH OTHER GAMES AND ACTIVITIES. *

4. YOUR FIRST UNIT WILL COVER VOCABULARY, OR THE MEANING OF WORDS THAT YOU'LL NEED TO KNOW. *

5. NEXT, AND VERY INTERESTING, IS A UNIT ON THE DIFFERENT ORGANISMS THAT LIVE AROUND THE MANGROVES. *

6. AS THESE BOYS CAN TELL YOU SOME STRANGE ANIMALS LIVE HERE. *

7. MANY OF THE ANIMALS THAT LIVE HERE ARE EATEN BY THEIR NEIGHBORS. AS YOU KNOW THIS MAKES UP A FOOD CHAIN. WE'LL LEARN MORE ABOUT FOOD CHAINS THIS YEAR. *

8. OF COURSE IN THE LAST UNIT WE'LL LOOK AT EVERYTHING TOGETHER THAT MAKES UP THE MANGROVE COMMUNITY. WELL, LET'S GET THING STARTED BY LEARNING A LITTLE MORE ABOUT THE MANGROVES. *

9. THE MOST STRIKING FACT ABOUT THE MANGROVE TREES IS THEIR HABITAT OR HOME. *

10. THESE TREES ARE RED MANGROVES. THEIR HABITAT IS THE SALT WATER. YOU CAN TELL THE RED MANGROVES BY THEIR LONG SPIDER-LIKE ROOTS. THE RED MANGROVE'S HABITAT IS RIGHT ALONG THE SHORELINE. *

11. FOR THE MANGROVES TO THRIVE THEY MUST HAVE JUST THE RIGHT SALINITY. SALINITY IS THE AMOUNT OF SALT IN THE WATER. USUALLY PEOPLE WHO ARE CONCERNED WITH THE GROWTH OF THE TREE AND FISH IN THE MANGROVE AREA FIND IT NECESSARY TO CHECK THE SALINITY FROM TIME TO TIME. *

12. CHECKING THE WATER'S SALINITY IS USUALLY DONE WITH THIS INSTRUMENT. IT IS CALLED A HYDROMETER. *

13. A HYDROMETER IS A FLOATING INSTRUMENT USED TO FIND THE SALINITY OF WATER. *

14. THE HYDROMETER WORKS BY SIMPLY FLOATING IN THE WATER. THE HIGHER IT FLOATS THE MORE SALT THERE IS IN THE WATER. YOU CAN SEE THIS FOR YOURSELF BY MAKING SOME VERY SALTY WATER WITH TABLE SALT AND THEN FLOATING THE HYDROMETER IN THE WATER. PEOPLE WHO HAVE SALT WATER AQUARIUMS USE HYDROMETERS TO KEEP A CHECK ON THE CONDITION OF THEIR WATER. *

15. YOU WILL USUALLY FIND MORE THAN ONE RED MANGROVE ALONG THE SHORELINE. IF YOU WERE TO COUNT THE NUMBER OF RED MANGROVES IN AN AREA YOU WOULD THEN KNOW THE POPULATION OF RED MANGROVES. THE POPULATION IS THE TOTAL NUMBER OF ONE KIND OF LIVING THING IN AN AREA. *

16. AS YOU STUDY THE MANGROVE POPULATION YOU WILL NOTICE THERE ARE MANY DIFFERENT THINGS THAT LIVE WITH THE MANGROVES...SUCH AS THIS ALLIGATOR. *

17. ALL THE LIVING THINGS IN AN AREA ARE GROUPED INTO A COMMUNITY. A COMMUNITY IS A GROUP OF LIVING THINGS LIVING AND WORKING TOGETHER. *

18. PROP ROOTS OF THE RED MANGROVE ARE AN EERIE SIGHT IN THE MANGROVE COMMUNITY. *

19. PROP ROOTS LIKE THE ONES HERE HAVE MANY USES. DO YOU NOTICE HOW THE ROOTS REACH OUT INTO THE WATER? BY EXTENDING THEIR ROOTS OUT INTO THE WATER THEY PROVIDE A HOME FOR HUNDREDS OF ANIMALS. THE SHELTER PROVIDED IS A SAFE PLACE WHERE THE LARVAL FORM OF SOME GROW UP. *

20. THE LARVAL FORM OF AN ANIMAL IS AN EARLY STAGE OF GROWTH. AT THIS TIME IT DOES NOT LOOK AT ALL LIKE THE ADULT. REMEMBER THE CATERPILLAR IS THE LARVAL FORM OF THE BUTTERFLY. *

21. MOST EVERYONE CAN RECOGNIZE THIS ANIMAL AS A CRAB. IT IS THE TYPE OF CRAB YOU WOULD EXPECT TO FIND AROUND THE MANGROVES - A FIDDLER CRAB. THE MALE CRAB IS THE ONE WITH THE LARGE PINCER. *

22. BUT WOULD YOU KNOW THAT THIS IS THE LARVA FORM OF A BLUE CRAB? BARNACLES, CLAMS, OYSTERS ARE OTHER ANIMALS THAT HAVE INTERESTING LARVAL FORMS. *

23. MOVING FARTHER UP THE SHORE WE FIND WHERE THE BLACK MANGROVES USUALLY LIVE. THE BLACK MANGROVES' HABITAT IS IN THE INTERTIDAL ZONE. THIS ZONE IS COVERED BY WATER AT HIGH TIDE BUT NOT AT LOW TIDE. *

24. IN THE INTERTIDAL ZONE YOU CAN FIND LITTLE STICKS POKING UP THROUGH THE GROUND. CAN YOU SEE THEM IN THIS PICTURE? WELL LET'S TAKE A CLOSER LOOK SO YOU CAN REALLY SEE THEM. *

25. WHEN YOU LOOK CLOSELY YOU WILL REALIZE THAT THESE LITTLE "STICKS" AREN'T REALLY STICKS AT ALL. THEY ARE PART OF THE ROOT SYSTEM OF THE BLACK MANGROVE. *

26. THEY ARE THE BREATHING ROOTS OF THE BLACK MANGROVES. THE BREATHING ROOTS STICK UP OUT OF THE GROUND SO THAT WHEN THE TIDE COMES IN AND THE LAND IS COVERED WITH WATER THE TREE'S ROOTS WILL BE ABOVE THE WATER AND CAN STILL BREATHE *

27. BOTH THE PROPROOTS OF THE RED MANGROVE AND THE BREATHING ROOTS OF THE BLACK MANGROVES SERVE A VERY IMPORTANT PURPOSE FOR THE LAND. CAN YOU GUESS WHAT THIS WOULD BE? *

28. THEY PROTECT THE SHORELINE FROM EROSION. EROSION IS THE WEARING AWAY OF THE LAND BY WIND AND WATER. THERE ARE OTHER PLANTS IN DIFFERENT PARTS OF THE COUNTY THAT HELP STOP EROSION BUT THE MANGROVES ARE VERY IMPORTANT IN THIS AREA. *

29. WHERE THE MANGROVES ARE REMOVED FOR ONE REASON OR ANOTHER. AS THEY HAVE BEEN HERE, THERE IS NOTHING TO BREAK UP THE WIND AND WATER AND THE LAND IS SOON ERODED AWAY. *

30. ANOTHER IMPORTANT JOB THE MANGROVE ROOTS HAVE IS TO STOP AND HOLD DECAYING PLANT AND ANIMAL MATTER. CAN YOU SEE HOW THESE ROOTS HAVE TRAPPED THE DEAD LEAVES AND SMALL STICKS? *

31. DETRITUS IS THE NAME GIVEN TO THIS DECAYING MATTER. NOT ONLY DOES THE DETRITUS PROVIDE FOOD FOR SUCH ANIMALS AS THE SHRIMP AND CRAB, IT IS THE BEGINNING OF NEW LAND. AS MORE AND MORE DETRITUS IS CAUGHT AMONG THE ROOTS THE TREES GROW FARTHER OUT TOWARD THE WATER. *

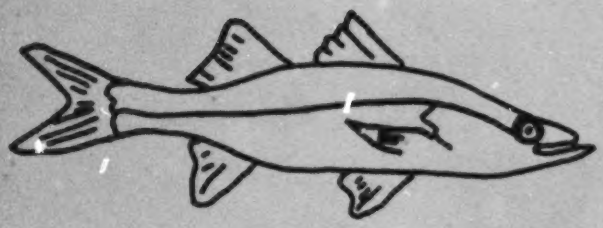
32. WHILE THE ROOTS OF MANGROVES ARE COLLECTING FOOD AND PROVIDING A HOME FOR ANIMALS AROUND THE WATER THE UPPER PARTS OF THE TREES ARE PERFORMING MANY DIFFERENT JOBS. AS YOU CAN PROBABLY TELL FROM THE PICTURE THE TREES ARE IMPORTANT FOR PROVIDING A NESTING PLACE FOR BIRDS. *

33. A PLACE WHERE BIRDS NEST AND HAVE THEIR YOUNG IS CALLED A ROOKERY. BIRDS SUCH AS PELICANS, EGRETS, AND CORMORANTS FIND THE TOPS OF THE MANGROVES AN IDEAL ROOKERY. *

34. JUST AS THE BIRDS, FISH, AND OTHER CREATURES FIND THE MANGOVES AN IDEAL PLACE IN WHICH TO LIVE WE HOPE YOU'LL FIND THE MANGROVES AN ENJOYABLE PLACE TO VISIT AND STUDY. *

The End

TEACHER - Please rewind the tape for its next use. Thanks.



ORGANISMS OF THE MANGROVE COMMUNITY

SNOOK

OYSTER

ALGAE

SPONGE

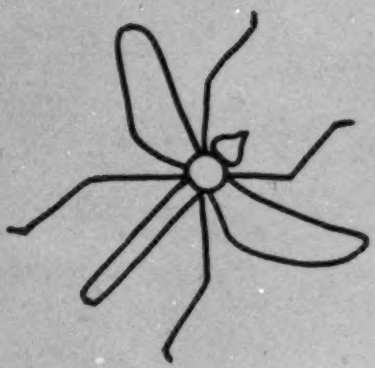
SNAPPER

CORMORANT

PELICAN

EGRET

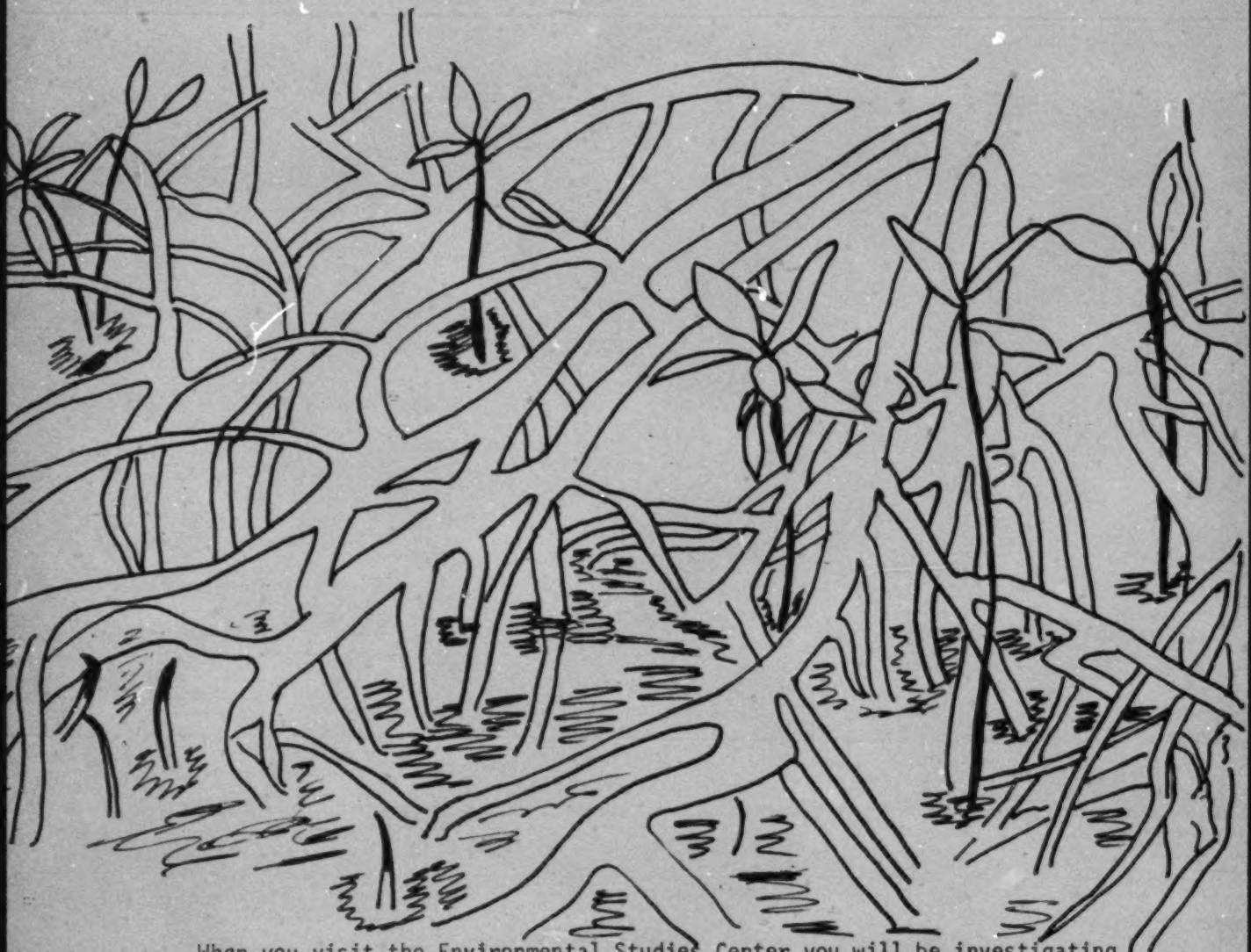
MOSQUITOES



Fourth Grade

MANGROVE COMMUNITIES

Mangrove communities are a part of the total ecosystem which makes up our Indian River. The mangroves, like all other living things, have an important relationship with all other life around them. They serve as a shelter for many small fish found in the river. They also serve as a place for the attachment of many animals such as barnacles, sea squirts and oysters.



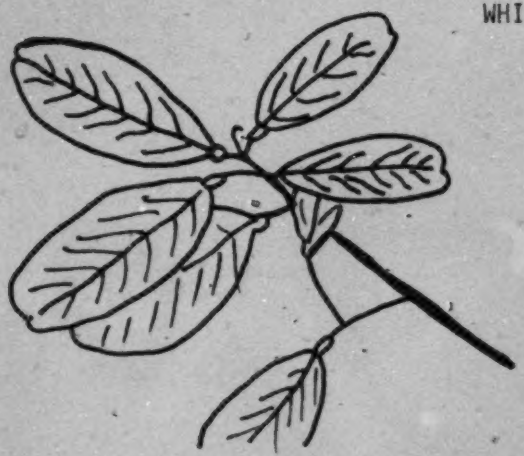
When you visit the Environmental Studies Center you will be investigating a mangrove community. This booklet will give you a brief introduction to some of the plants and animals found in the mangrove community.

PLANTS

RED MANGROVES

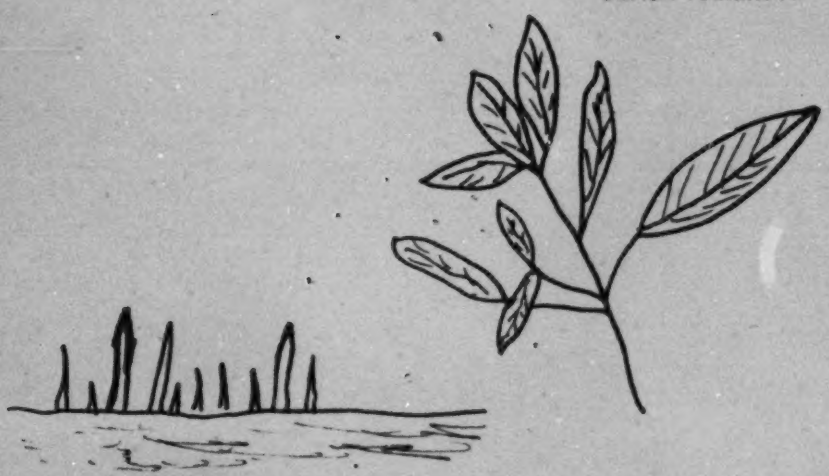
Red mangroves are easily recognized by their long prop roots which grow from the branches of the tree down into the water. They also have long pencil like seeds which are often found floating in the river. The red mangrove usually grows in the intertidal zone

WHITE MANGROVE



The white mangrove is recognized by its oval leaves. Each leaf has a notch in the tip of the leaf blade. On the leaf stem at the base of the leaf blade, there are also two little swellings. The white mangrove usually grows in an area just behind the intertidal zone.

BLACK MANGROVE



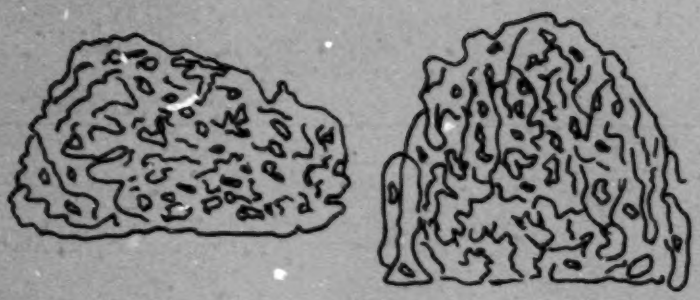
The black mangrove has three characteristics which help to identify it. It has darker bark than the other mangroves. It has breathing roots which stick up out of the soil around the base of the tree. Its leaves are green on the front and silvery on the back. Many times, except right after a rain, one side of the leaf will be covered with salt crystals. The black mangrove usually grows in an area that is only covered with water at very high tides.

ALGAE

The algae are plants that are found growing in waters all over the world. Some are so tiny they can only be seen with a microscope. Some are so large they may be 100 feet long or more. Algae are usually put into groups according to their colors.
For example: green algae, red algae and brown algae. Algae may be found attached to the roots of the red mangroves or floating in the water around the red mangrove.

ANIMALS

SPONGE

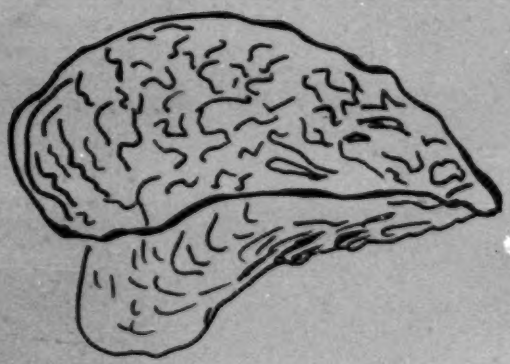


Sponges are very simple animals. Their body is full of thousands of very tiny holes and canals. In these canals they have small hairs which whip back and forth causing water to move through their body. As the water moves through them they trap tiny plankton in the water and use the plankton for food. Sponges are always found attached to something solid, and once they attach they can never move. Many sponges attach to the roots of the red mangrove.

SEA ANEMONE

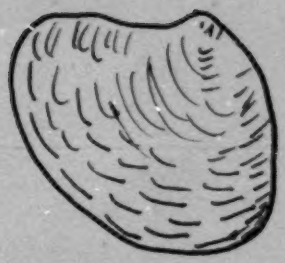
The sea anemones are animals that look like plants. Around their mouth they may have hundreds of arm-like tentacles which they use to catch their food. Some anemones catch fish in their tentacles and sting them to death. Other anemones spread out their tentacles and catch small particles floating in the water. Anemones are almost always found attached to something solid; although they may slowly move from place to place. You will find many different kinds of anemones attached to the roots of the red mangroves.

OYSTERS



Oysters are related to clams and mussels. They have two shells which cover their soft bodies inside the shells. One of the shells of the oyster is always attached to something solid. Since they cannot move, oysters use tiny hairs to make water flow in between their shells. They have sticky material on part of their body which traps tiny plankton and detritus in the water for food. Oysters may be found growing on rocks, sea walls and red mangrove roots.

CLAM

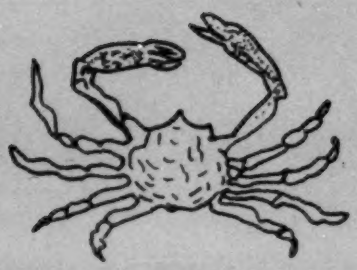


Clams are related to oysters and mussels. They have two shells which cover their soft bodies inside the shells. Clams have a hard foot which helps them dig into the mud and sand on the bottom of the river. They have two long tubes which they stick up through the sand and suck water down through their shells. They trap plankton and detritus in the water for food. Clams are often found buried in the mud around the red mangrove roots.

MUSSELS

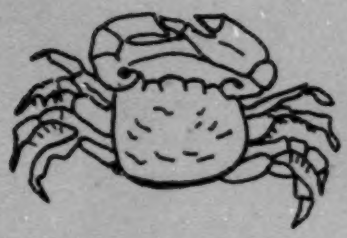
Mussels are related to oysters and clams. They also have two shells. Mussels attach by using hundreds of tiny threads. Large clumps of mussels may be found attached to red mangrove roots. They eat plankton much like the oyster does.

SPIDER CRAB



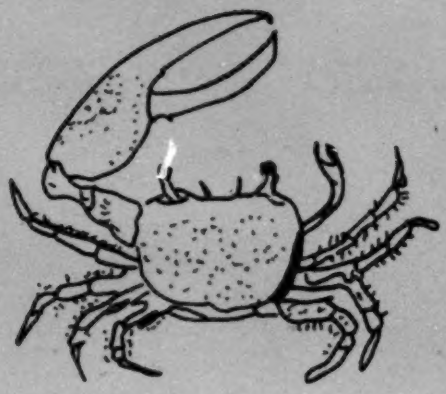
The spider crab has long spider-like legs. He is very slow moving and cannot swim. You can often find him crawling around the red mangrove roots. Spider crabs are scavengers. They eat just about anything they can find on the bottom. Sometimes you will find a spider crab with a sponge growing on its back.

MANGROVE CRAB



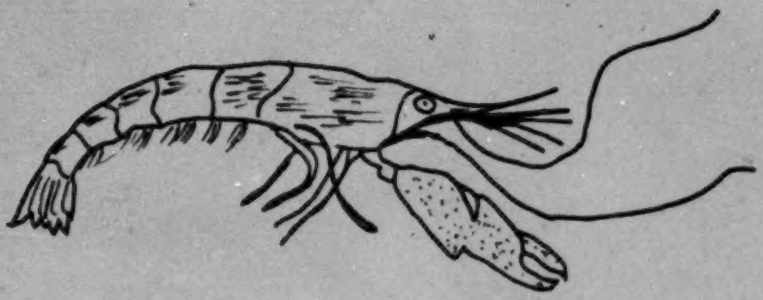
The mangrove crab has a flat square body with curved legs for holding onto rocks and tree roots. These little crabs are good climbers and can be found running all over the red mangrove trees.

FIDDLER CRAB



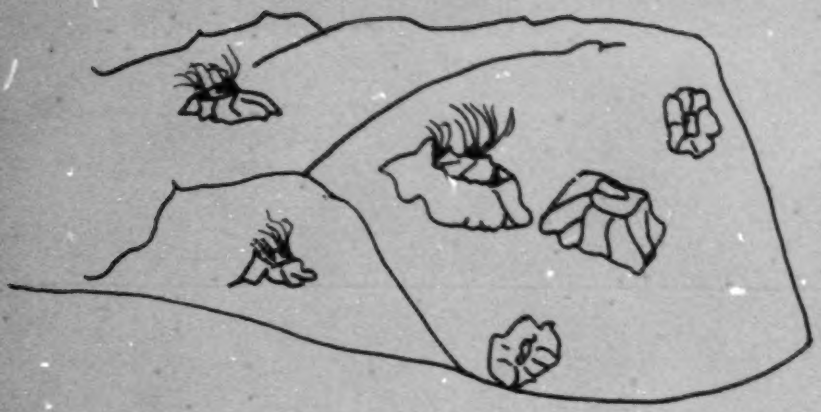
Fiddler crabs are easily recognized by the one large claw which the males have. They live in holes which they dig in the sand along the water's edge. Sometimes you can see large "herds" of fiddler crabs moving among the roots of the black mangroves. They feed on detritus found in the mud.

PISTOL SHRIMP



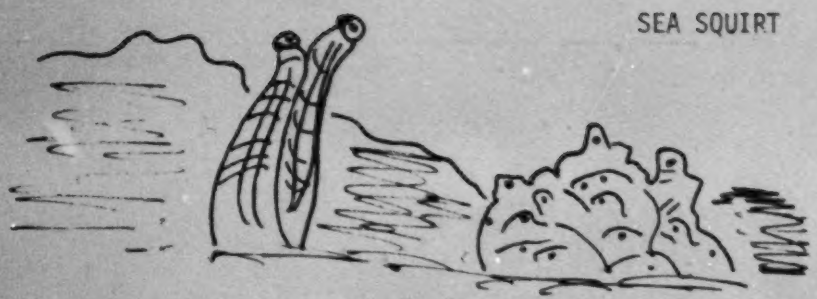
The pistol shrimp also has one large claw and one small claw. They use the large claw to snap shut and stun their prey. Pistol shrimp live in holes in rocks and around mangrove roots. They like to find spaces in sponges and hide inside. They eat small fish and other shrimp. If you are very quiet while visiting a mangrove community you may hear the popping sound of a pistol shrimp.

BARNACLE



Barnacles are relatives of the crabs and shrimp. When a barnacle is very young it swims around looking for a place to attach. Once it attaches it never can move to another place. Barnacles build around them a series of shells which form a house for them. Barnacles feed by kicking their feet into the water and catching plankton. You will find barnacles attached to the roots of red mangroves.

SEA SQUIRT

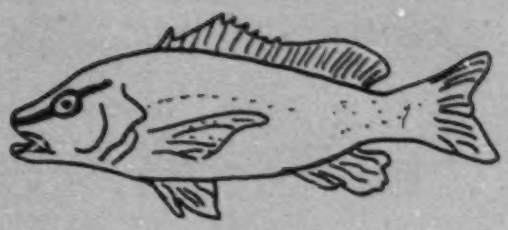


Sea squirts look very much like sponges except they only have two openings into their body while sponges have many. They pull water in one opening and strain plankton and detritus out of the water. If you squeeze them gently they will squirt water at you. Sea squirts can be found attached to the roots of red mangroves.

MOSQUITOES

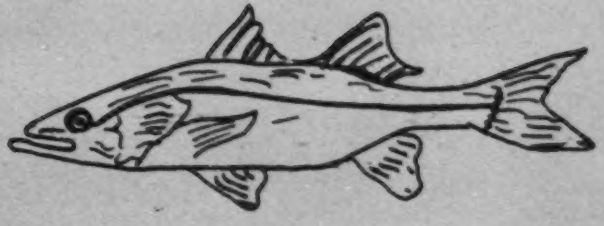
Mosquitoes are small insects which are often found in or around mangrove swamps. They lay their eggs in water trapped around the roots of black mangroves. Mosquitoes serve as food for many small birds and fish found in the mangrove community.

MANGROVE SNAPPER



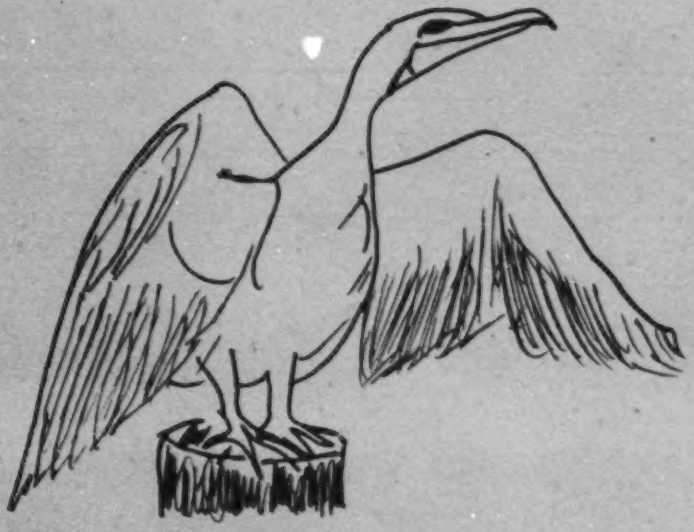
The mangrove snapper is recognized by a dark stripe which runs from his nose across his eye. Young snappers hide among the mangrove roots for protection from larger fish. Older mangrove snappers feed on barnacles, mangrove crabs and other small fish living among the red mangrove roots.

SNOOK



The snook is recognized by a dark stripe which runs along the side of its body from the gills to the tail. Snook are good fighting fish and can often be found feeding on smaller fish around the red mangroves.

CORMORANT



Cormorants are dark colored, swimming water birds. They are most often seen diving underwater for fish or sitting on markers or in trees drying their wings. Cormorants are good swimmers and can swim underwater to catch fish. Cormorants often nest in mangroves.

EGRET

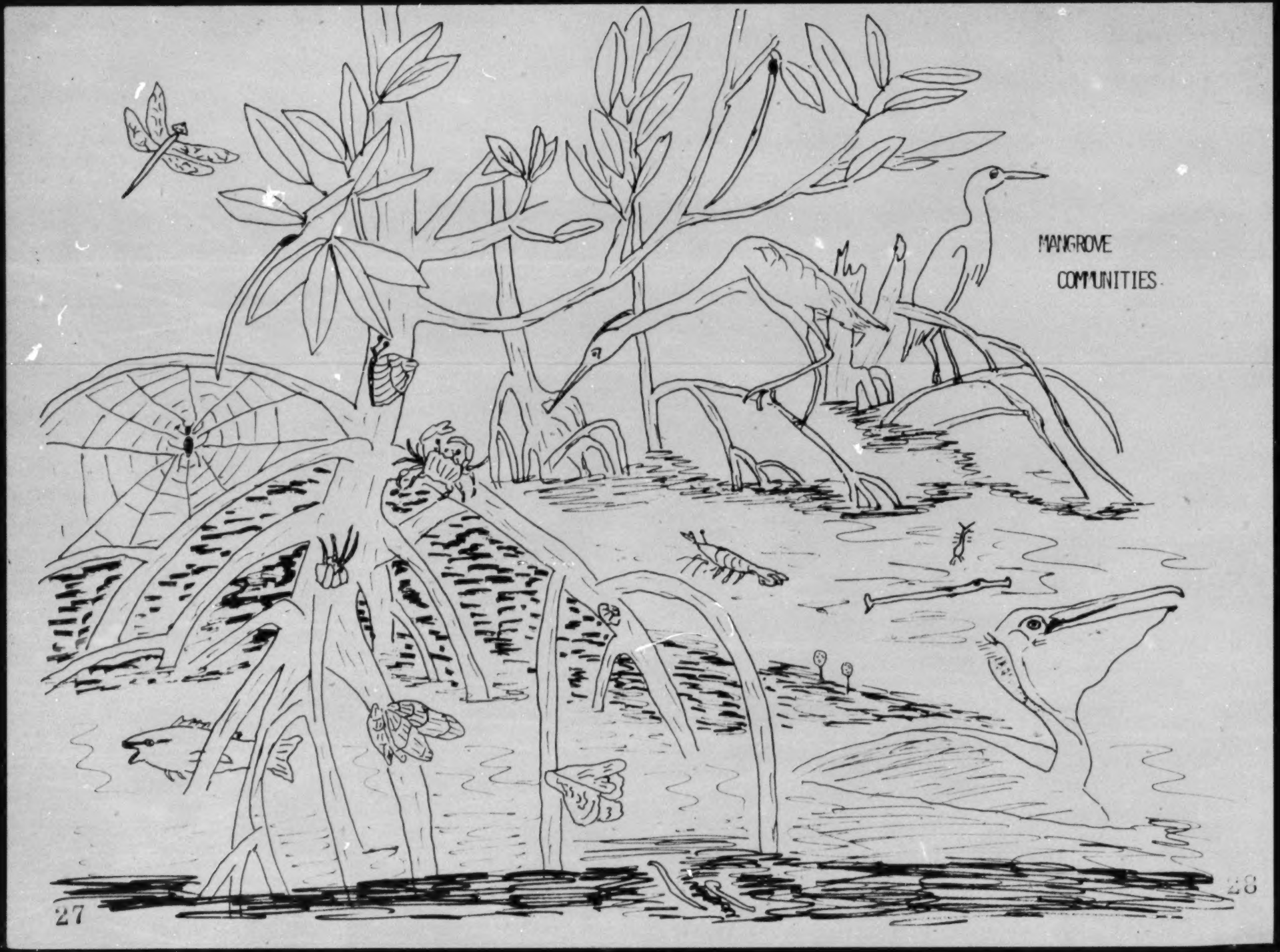
Egrets are usually recognized as having white feathers and black legs. The common egret has a large white body, yellow bill, and black legs and black feet. The snowy egret is smaller and has a black bill with black legs and yellow feet. Egrets can be seen nesting in mangrove areas or looking for small fish, crabs and animals of the mangrove community.

BROWN PELICAN

The brown pelican can often be seen flying over the Indian River in search of food. Sometimes they fly so close to the water that their wing tips almost touch the surface of the water. Brown Pelicans do not swim after their food. They spot fish from the air, and then dive straight down into the water and scoop up the fish in their pouch-like beak. Pelicans often nest in mangroves

Martin County Schools'
Environmental Studies Center
2900 N.E. Indian River Drive
Jensen Beach, Fla. 33457

Organisms of the Mangrove Community & where they live!
Fourth Grade


MANGROVE
COMMUNITIES

RED MANGROVE - TREE TOP BRANCHES AND LEAVES

PELICAN/ PELICAN NEST	- He is a white headed brown bird which dives for fish and nests in the tops of the mangrove trees.
GREAT BLUE HERON	- The large, long spindly-legged, gray bird roosts and builds its nest on the mangrove tree tops.
EGRET	- A long-legged white bird which builds its nests on the tree tops.
CORMORANT	- These dark diving birds are often found on the mangrove roots or branches drying their wings.
DRAGON FLY	- An insect often called a "mosquito hawk" because it feeds on both mosquito larva and adult mosquitoes found around the mangrove areas.
SPIDER	- Spiders find the quiet tangle of prop roots and branches a fine place to spin webs.

Martin County Schools'
Environmental Studies Center
2900 N.E. Indian River Drive
Jensen Beach, Florida 33457

DRAGON FLY
PELICAN NEST
BLUE HERON
MANGROVE CRAB
SPIDER
MANGROVE SNAIL
CORMORANT

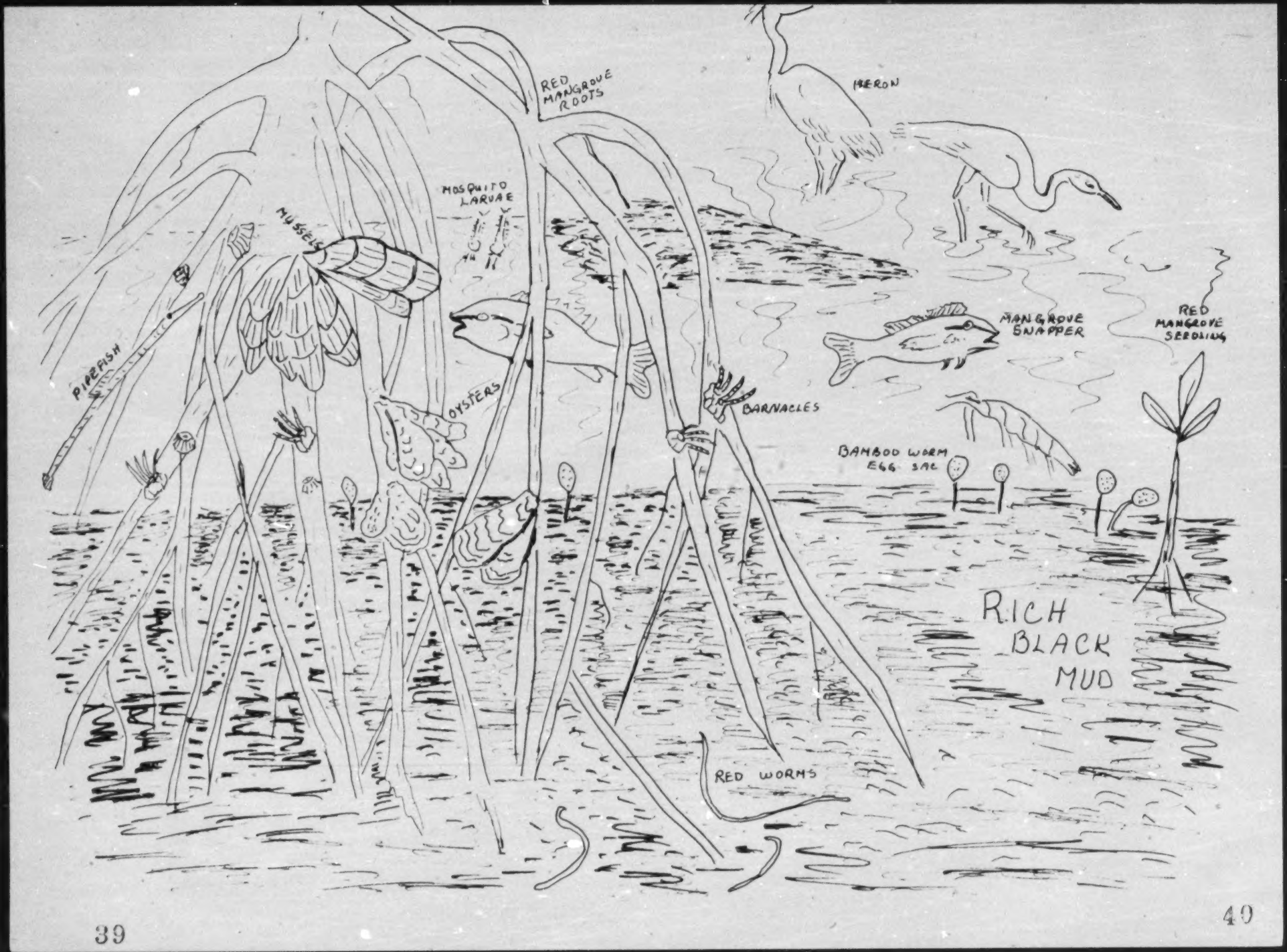
RED MANGROVE ROOTS ABOVE HIGH TIDE WATER LINE

MANGROVE SEED	- These long bean-like seeds float in the water until the sharp pointed end gets trapped in the sand or mud and begins to grow.
MANGROVE SNAIL	- This periwinkle snail is found mainly on the mangrove roots and leaves.
MANGROVE CRAB	- A larger square backed relative of the fiddler crab is also found on the mangrove.
ADULT MOSQUITO	- The adult mosquito is found around the swampy area of the mangroves where they lay their eggs.
SPIDER	- Spiders find the quiet tangle of prop roots and branches a fine place to spin webs.
HERMIT CRAB	- This crab who occupies a discarded snail shell can usually be found among the roots in search of food.
GREAT BLUE HERON	- This long spindly legged, grey bird stalks the areas around the mangrove in search of fish.
EGRET	- A long legged white bird (smaller than the great blue heron) with a straight beak, also finds the mangrove areas a good source of fish.

MANGROVE SEED
ADULT MOSQUITO
SPIDER
MANGROVE CRAB
BLUE HERON
EGRET
HERMIT CRAB
MANGROVE SNAIL

RED MANGROVE ROOTS BELOW HIGH TIDE WATER LINE

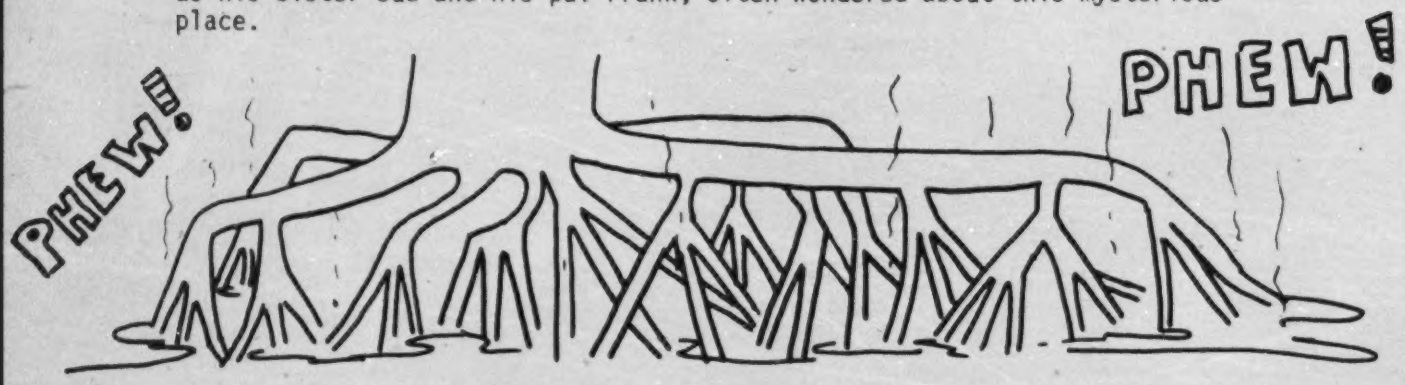
RED MANGROVE SEEDLING	- These long bean-like seeds float in the water until the sharp pointed end gets trapped in the sand or mud and begins to grow.
BARNACLES	- This crab and shrimp relative is found attached to the roots with a cement-like material.
MUSSELS	- Brownish black relatives of the oyster which attach themselves to the roots in clusters by many tough tiny hairs.
OYSTER	- This rocky shell relative of the clams and mussels is also found attached to the roots. These sharp ragged edged animals form rock-like masses.
SHRIMP	- Many shrimp found in the river swim among the tangle of red mangrove roots.
PIPEFISH	- This cousin of the seahorse swims among the roots looking for food.
MANGROVE SNAPPER	- These fish are often found swimming around the mangrove. They can be recognized by a black stripe running horizontally across their eyes.
BAMBOO WORM EGG SACS	- These sacs look like clear jewel-like drops filled with tiny specks. These specks are the eggs of the bamboo worm. The sac is attached to the worm's home in the mud.
RED WORM	- This relative of the earth worm is well adapted to its home in the detritus around the roots.
MOSQUITO LARVAE	- The eggs laid in the swampy area around the mangrove roots hatch into larvae which must breath air. These larvae are found breathing at the surface or darting around in search of food below.


RED MANGROVE ROOTS
HERON
MOSQUITO LARVAE
MUSSELS
PIPEFISH
OYSTERS
BARNACLES
MANGROVE SNAPPER
RED MANGROVE SEEDLING
BAMBOO WORM EGG SAC
RICH BLACK MUD
RED WORMS

THE MYSTERIOUS MANGROVES
? ? ? ?
4th Grade

THE MYSTERIOUS MANGROVES

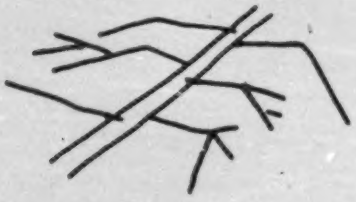
There it was, eerie looking, bad smelling with many strange sounds coming from it. It had been there since Jim could remember and he, as well as his sister Sue and his pal Frank, often wondered about this mysterious place.



Their science teacher at school called it a 'mangrove swamp' and said it was a very important part of their environment. Jim, Sue and Frank couldn't see how this could be. They were actually afraid to enter such a miserable looking place.

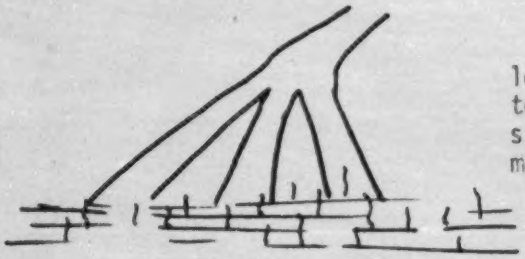
Well, tomorrow was going to be the big day. Their science teacher, Mr. Myers, had told them he was going to take a trip into the mangroves and wanted them to go along. Frank told Jim and Sue that he was going to be sick that day, but they reminded Frank of the oath they all took. They had to stick together no matter what. Besides, Mr. Myers was going with them so it wouldn't be all that bad.

The three met Mr. Myers at the school on Saturday after lunch and were off on their trip to the 'mysterious mangroves'. While driving over to the swamp, Mr. Myers told them that there were three types of mangrove trees -- red, white and black.



"The red mangrove", he said, "is the eerie looking one that has roots that look like spider legs. They are called PROP ROOTS. The mangrove grows in the intertidal zone which is covered by water at high tide but exposed at low tide."

He continued, "The white and black mangroves grow further back in the high tide zone. The white have light green, notched leaves.



"The black mangrove has small, dark green leaves with a silver back, Mr. Myers went on to explain. "You will see many 'breathing roots' sticking up from the ground around the black mangroves."

salinity = salt + water

It was 2:00 p.m. when they finally arrived at the swamp. Mr. Myers had the three help unload the equipment.

"First," he said, "we'll test the salinity of the water in both the low tide zone and in the pools in the high tide area." He explained that salinity merely meant how much salt was in the water.

Mr. Myers said, "There is an instrument you can use to tell the salinity of the water. It is called a hydrometer. The hydrometer works on the principle or rule that the more salt in the water, the heavier the water will be. If you dropped a stick into very salty water it would float higher than if you dropped a stick into fresh water. The hydrometer looks something like a stick with a scale on top."

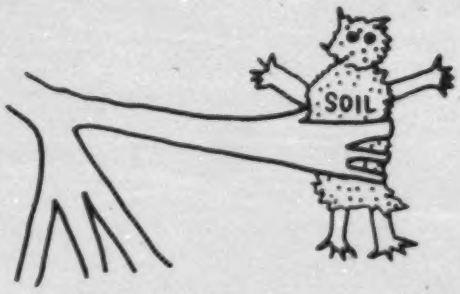
Mr. Myers lowered the hydrometer into a tube of water and it floated. He read the scale on top and then the temperature. With these two readings he used a chart which helped him find the salinity.

By the time they finished they were all wondering why it was important to know the amount of salt in the water anyway.

Mr. Myers explained, "This salt water is an important part of the habitat of the mangrove swamp and these trees could not live without the salt water. Just like your habitat is your home, the salt water is the trees' habitat or home."

After they put the instruments away, they decided to do some exploring in the area. The first thing they noticed was the spider-like roots which Mr. Myers said belong to the red mangroves.

Frank asked, "Why do they grow like that?"



Mr. Myers said, "They grow like that to hold up the limbs of the tree. These roots act like walls and stop erosion or washing away of the soil."

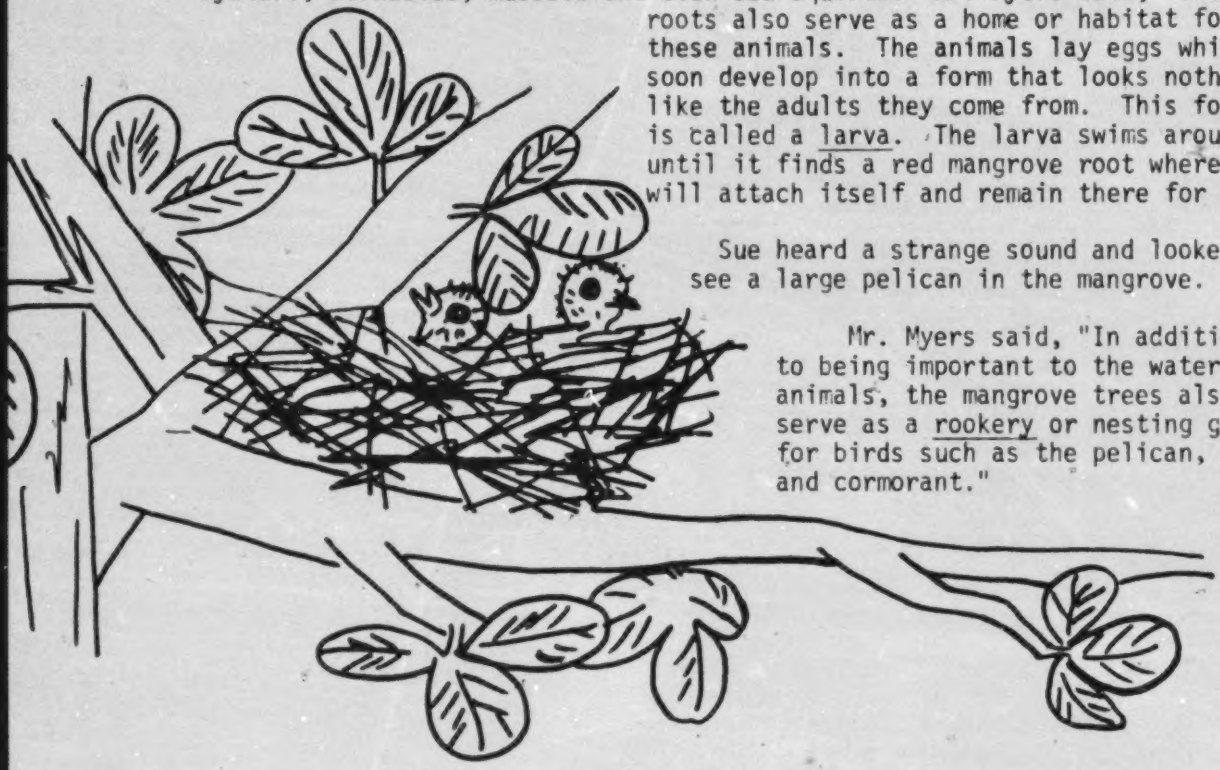
Jim was farther up on the shore and called Mr. Myers over. He asked if the things sticking out of the ground were roots.

Mr. Myers said they were the breathing roots of the black mangrove. He said, "Because roots need to breathe just like we do and because they are underwater, the roots grow upward in order to breathe. The roots of the black mangrove also help hold the soil together."

Sue wanted to know, "Where are the white mangrove roots?"

Mr. Myers explained, "The roots of this tree run deep into the ground and like the roots of the other trees hold the soil together."

Frank noticed that the roots of the red mangrove were covered with oysters, barnacles, mussels and even sea squirts. Mr. Myers said, "These roots also serve as a home or habitat for these animals. The animals lay eggs which soon develop into a form that looks nothing like the adults they come from. This form is called a larva. The larva swims around until it finds a red mangrove root where it will attach itself and remain there for life."



Sue heard a strange sound and looked up to see a large pelican in the mangrove.

Mr. Myers said, "In addition to being important to the water animals, the mangrove trees also serve as a rookery or nesting ground for birds such as the pelican, egret, and cormorant."

Frank, still standing on the red mangrove roots, said "This place is really interesting, except that it smells."

They all laughed as Frank attempted to jump off the roots. As he landed he sank a couple of inches into the muck. He quickly called to Mr. Myers.

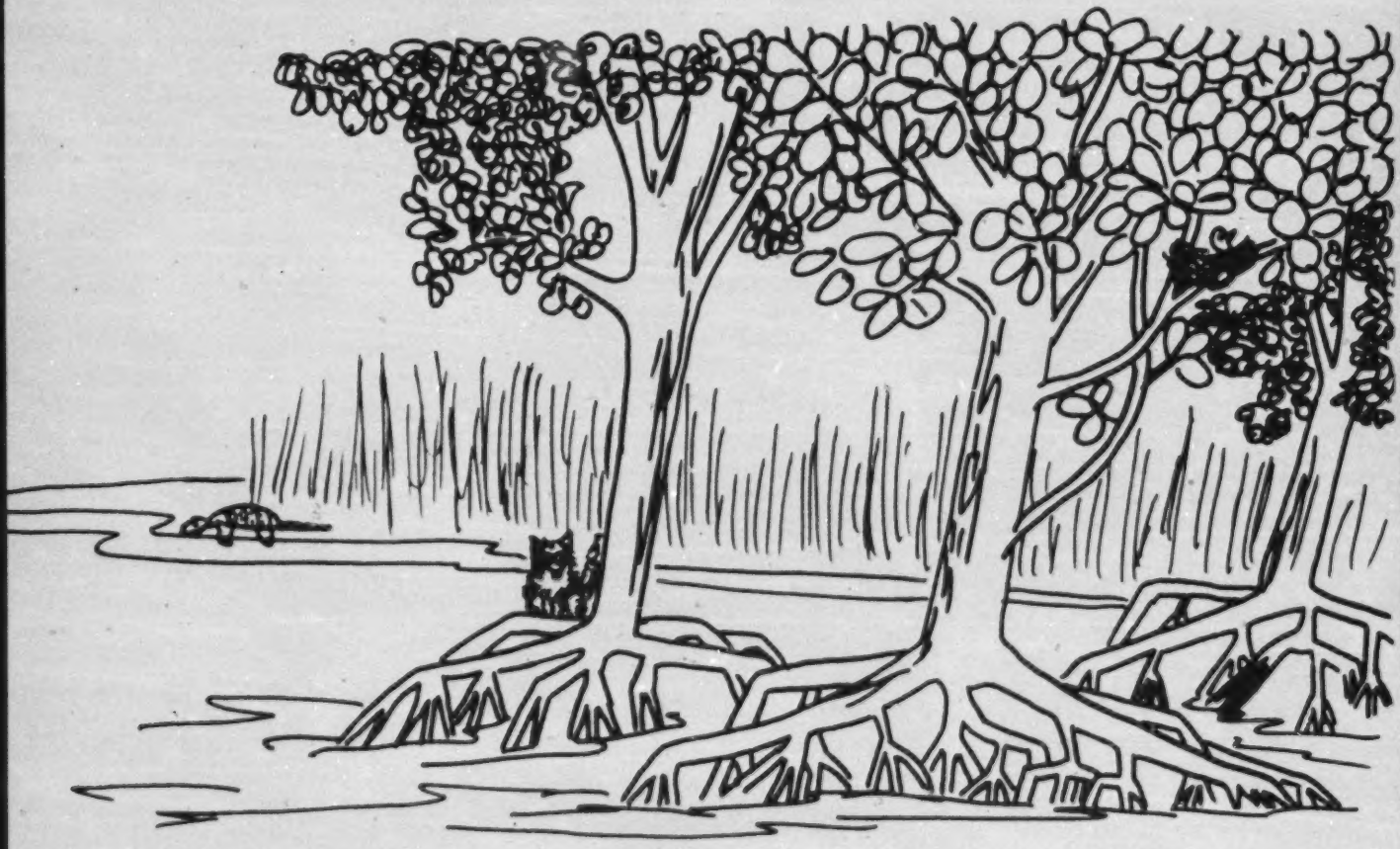
"Quick sand, quick sand -- help!!

Mr. Myers ran over and chuckled. He explained that Frank wasn't really in quick sand, but that he had jumped into some of the richest soil in the world. This soil has been built up by mangrove leaves dropping to the ground and decaying. Also, many animals die and decay to form this soil. He called it "detritus" and said many animals like crabs feed upon this substance.

By now, Frank realized he wasn't sinking and easily stepped back onto another mangrove root. "Well, the sun is going down" Mr. Myers said, "we had better start home."

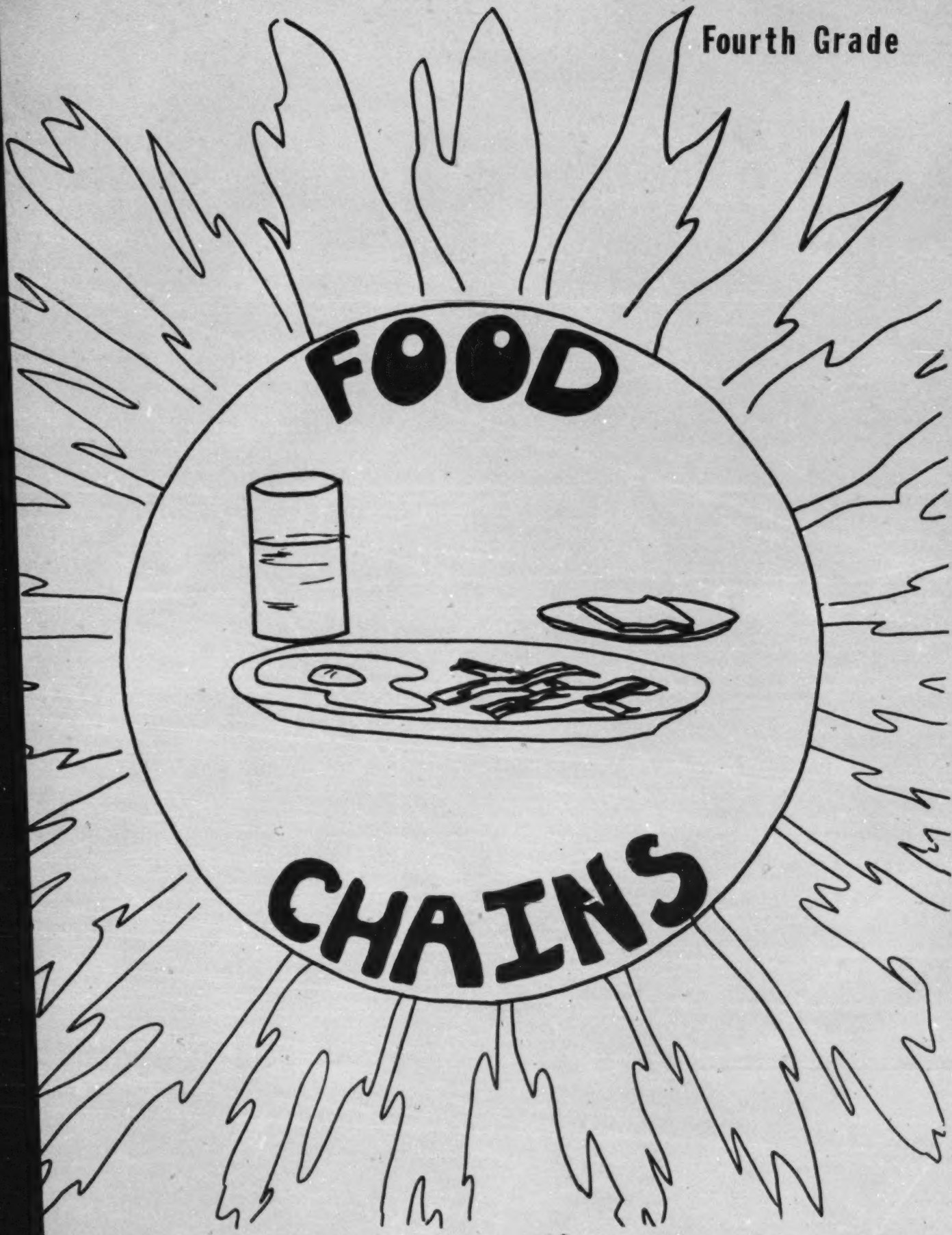
As they were riding back home, Mr. Myers told them to remember that the mangrove swamp is like a community -- made up of many different kinds of plants and animals living together.

They all had a great time, even Frank. All of them would see the mangrove swamp not as an eerie, bad smelling, mysterious place, but as a community, full of life and a very interesting place to visit. They were going to tell all their friends about the mangroves and maybe go on another trip to the mangroves next week.



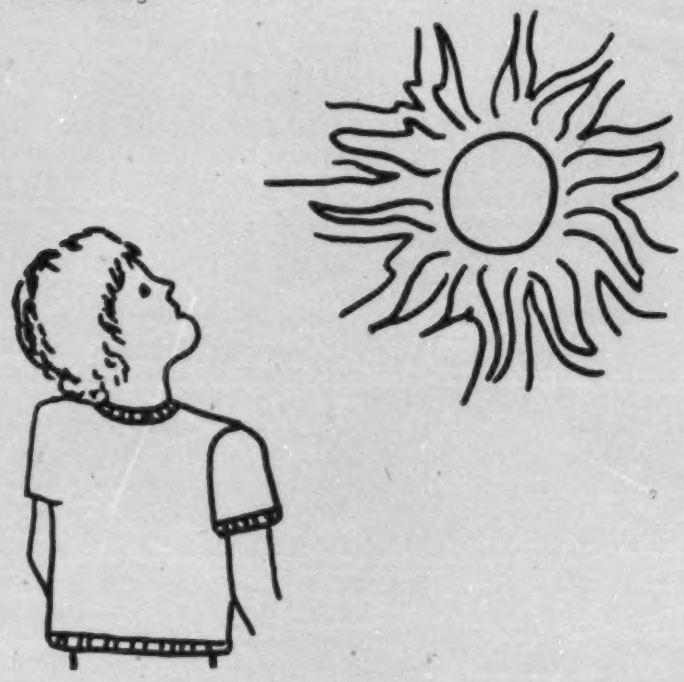
Martin County Schools'
Environmental Studies Center
2900 N.E. Indian River Drive
Jensen Beach, Florida 33457

Fourth Grade



FOOD CHAINS

When you are out of doors doesn't the warm sunshine feel good on your skin? Have you ever wondered why sunshine makes you feel so warm? When the sun's light energy hits your skin, much of it is changed to heat energy. The heat energy is what gives you that warm feeling.

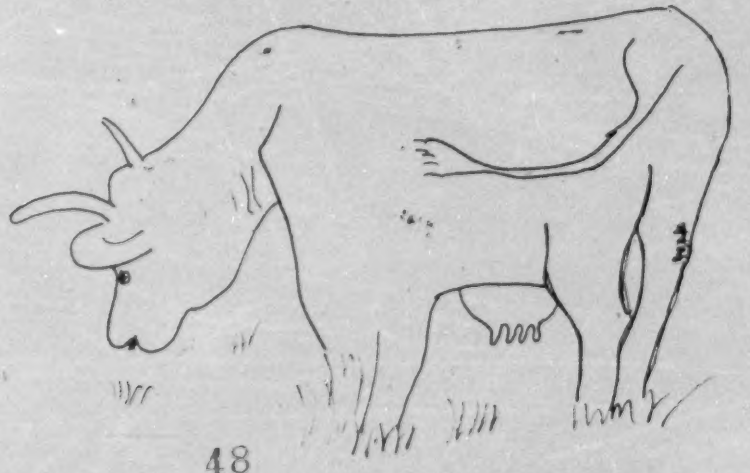


Since we all need energy to run, swim and do all the things that we do in life, wouldn't it be nice if we could just lie in the sun and soak up all the energy we need? But as you know, we cannot get the energy to run our bodies directly from the sun. We have to get that energy from the food we eat. How does that energy get into the food?

Green plants can use the energy of sunlight to make food. This is called photosynthesis. They also change the sun's light energy into chemical energy which is stored in the food we eat. The cells of our bodies release the chemical energy from the food and use it to make muscles pull, brains think and heat to warm our bodies. We also store some of that energy in our cells so we can use it if we need a lot of energy at one time -- for example, running a race. The energy we use to run our bodies actually comes from the sun, but it has to go through a green plant first.

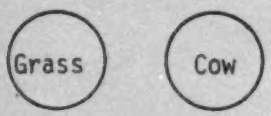
We also eat other things besides plants. When you eat meat you also get energy from the meat. How did the energy get there?

Cows eat grass, and you eat cows. Grass is a green plant and gets its food energy from the sun. The cow eats the grass and gets its energy from the grass. The cow uses the energy just as you do. Some of the chemical energy is also stored in the meat of the cow just like you store energy in your muscles. When you eat meat you get energy from the meat. But remember, the cow got its energy from the grass, and the grass got its energy from the sun; so the energy you get from meat is also from the sun. It had to pass through the grass, then through the cow and finally to you.

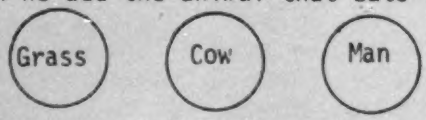


Sometimes we need to show how the sun's energy passes from one living thing to another. We do this with a food chain. Let's see if we can make a food chain with the grass, cow and man. First, we usually start with the green plant.

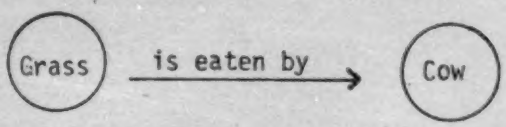
Then we add the animal that eats the plant. In this case the cow.



Then we add the animal that eats the cow. In this case, man.

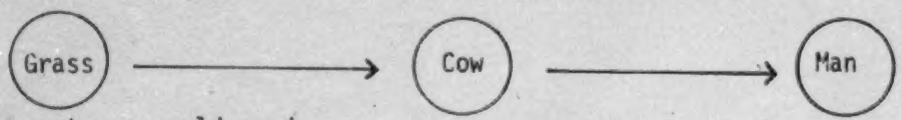


But how do we show what eats what? You know that the grass doesn't eat the cow. The grass is eaten by the cow. In order to show this we use an arrow ⟶ The arrow means is eaten by.



This can be read just like a sentence. The grass is eaten by the cow. Can you read this chain?

The cow is eaten by man. If we put these together we get:

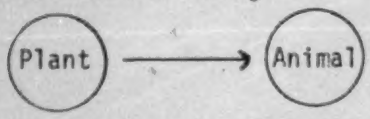


This sentence would read:

The grass is eaten by the cow, and the cow is eaten by man.

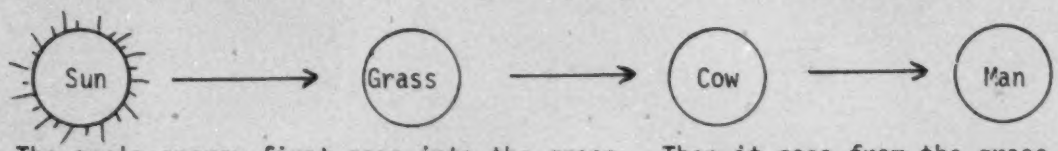
We use a food chain like this to show how the sun's energy passes from one living thing to another. The arrows (⟶) show us the direction the energy is going.

Look at the following:



The energy is going from the plant to the animal.

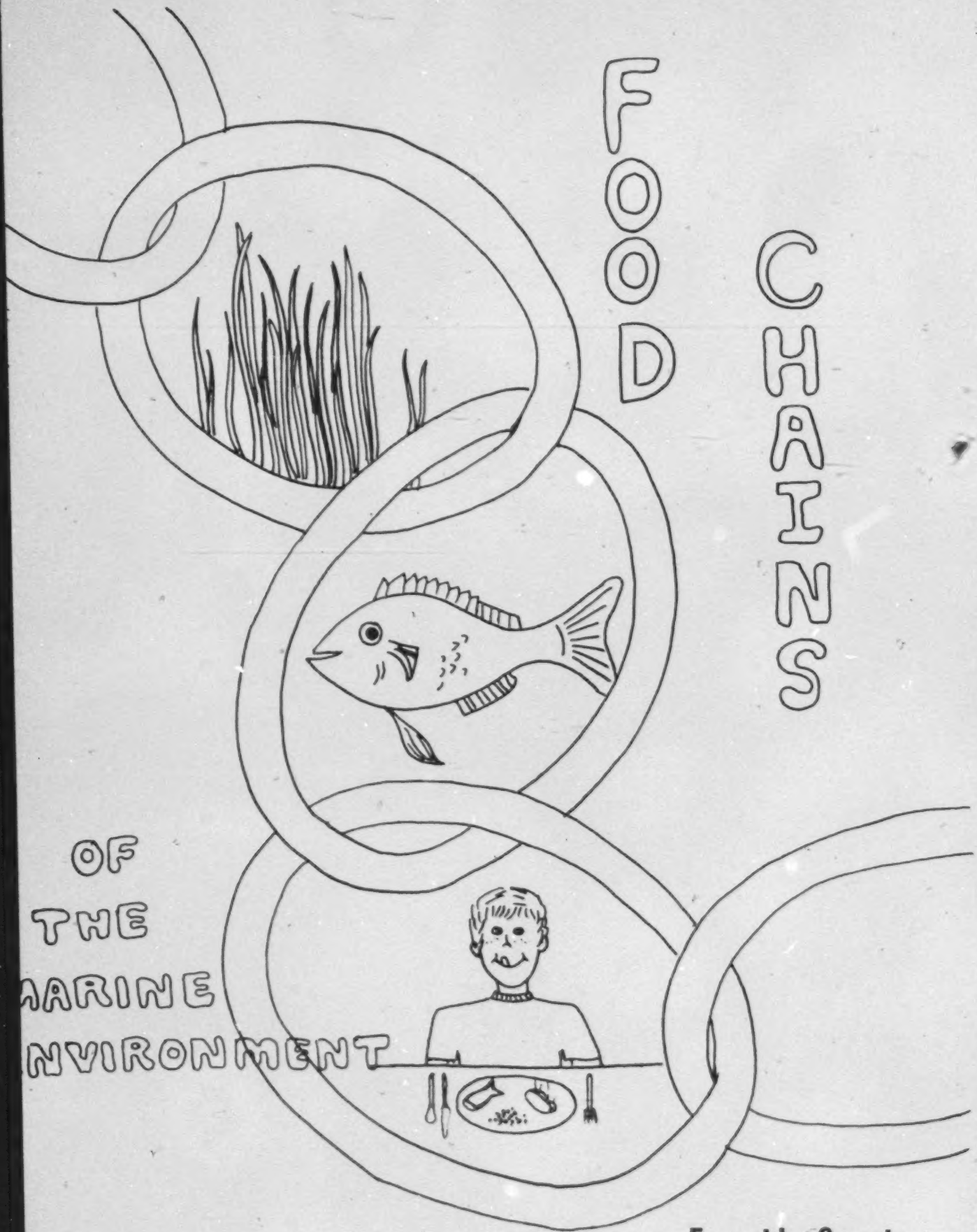
Now, can you tell where the energy is going in our first food chain?



The sun's energy first goes into the grass. Then it goes from the grass to the cow. Finally, the energy goes from the cow to man.

Martin County Schools'
Environmental Studies Center
2900 N. E. Indian River Drive
Jensen Beach, Fla. 33457

FOOD CHAINS



OF THE MARINE ENVIRONMENT

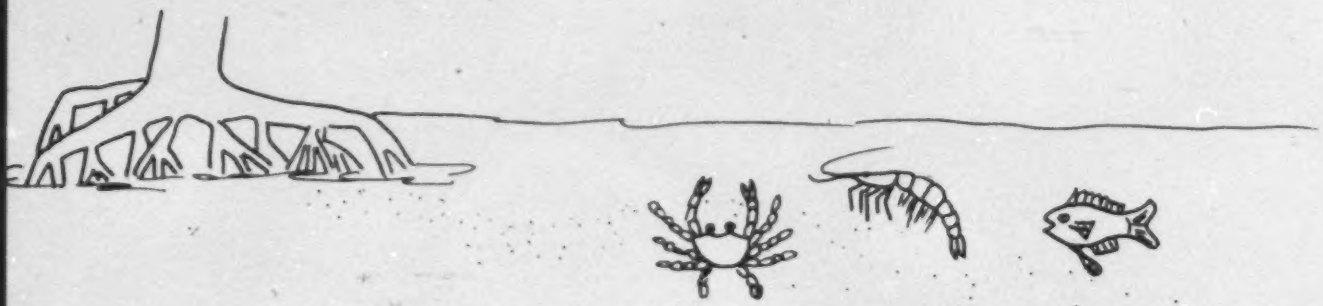
Fourth Grade

MANGROVE COMMUNITY FOOD CHAIN

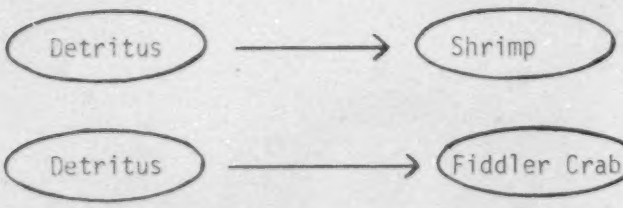
Let's look at some food chains found in the mangrove community.

There are three basic types of plants found in the mangrove community: The mangroves themselves; plant plankton; and attached algae.

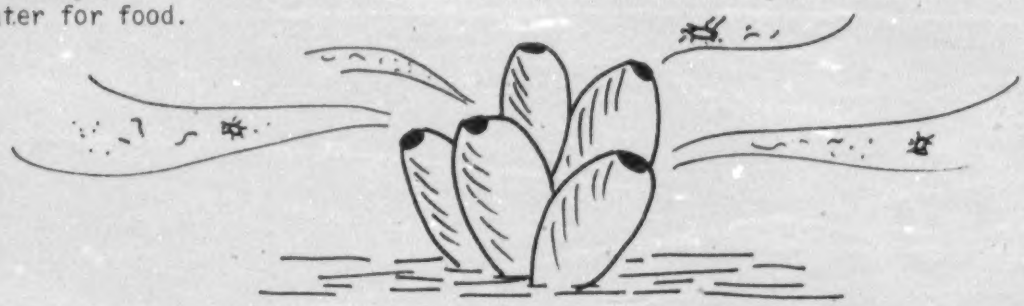
Mangroves usually are not eaten directly by animals; however, when their leaves fall to the ground they help to make up the detritus around the base of the mangrove. As the tides move in and out the detritus is flushed out into the Indian River. There shrimp, small fish and many other detritus eaters have a feast on the mangrove detritus.



When we draw pictures to show a food chain, we can't always draw pictures like the one above. We can use the arrow and the circle.



As you already know, plankton is made up of thousands of tiny plants and animals floating in the water. The green plant plankton makes food just like the larger, green land plants do. Barnacles, sea squirts, oysters and many other attached animals are adapted to straining plankton out of the water for food.



Plankton → Sea Squirt

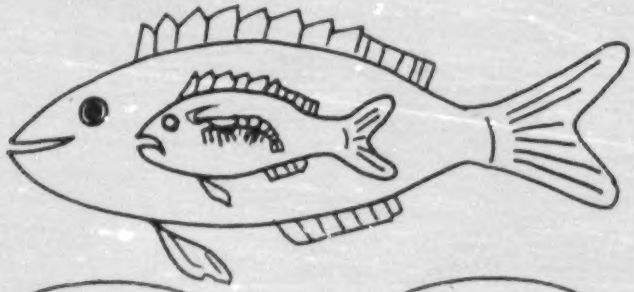
Plankton → Oyster

Algae may be found attached to the roots of the red mangroves. Most all algae can make food by phytosynthesis just like green land plants. Algae can serve as food for many small fish and all kinds of crawling and creeping animals like snails and crabs.

Algae → Snail

Algae → Mangrove Crab

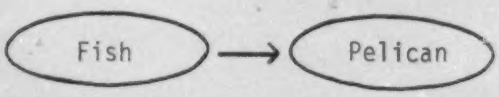
Many fish in the mangrove community are meat eaters. They do not get their energy directly from plants. The snapper and many other fish swimming among the mangrove roots feed on barnacles, shrimp, oysters and small crabs.



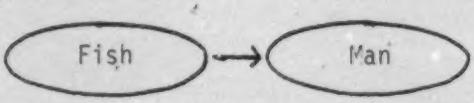
Shrimp → Snapper

Small Fish → Larger Fish

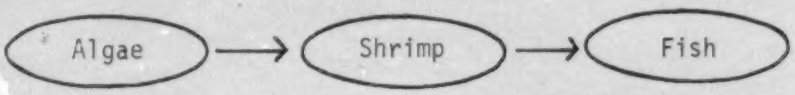
The birds in the mangrove community are usually the last in the food chain. The pelicans, egrets and cormorants spend much of their time hunting for fish to eat.



Of course many times man is also found at the end of the food chain.



Now, let's see if we can put some of these short food chains together into a longer one. Can you put shrimp, algae and fish into one chain?



The algae is eaten by shrimp. The shrimp is eaten by fish.

ON A PRACTICE SHEET OF PAPER, see if you can make food chains with the following plants and animals.

1. shrimp, detritus, pelican, fish
2. crab, algae, snail, man
3. fiddler crab, mangrove snapper, detritus, pelican
4. plankton, egret, worm, fish

(Answers upside down on bottom of page.)

Martin County Schools'
Environmental Studies Center
2900 N.E. Indian River Drive
Jensen Beach, Fla. 33457

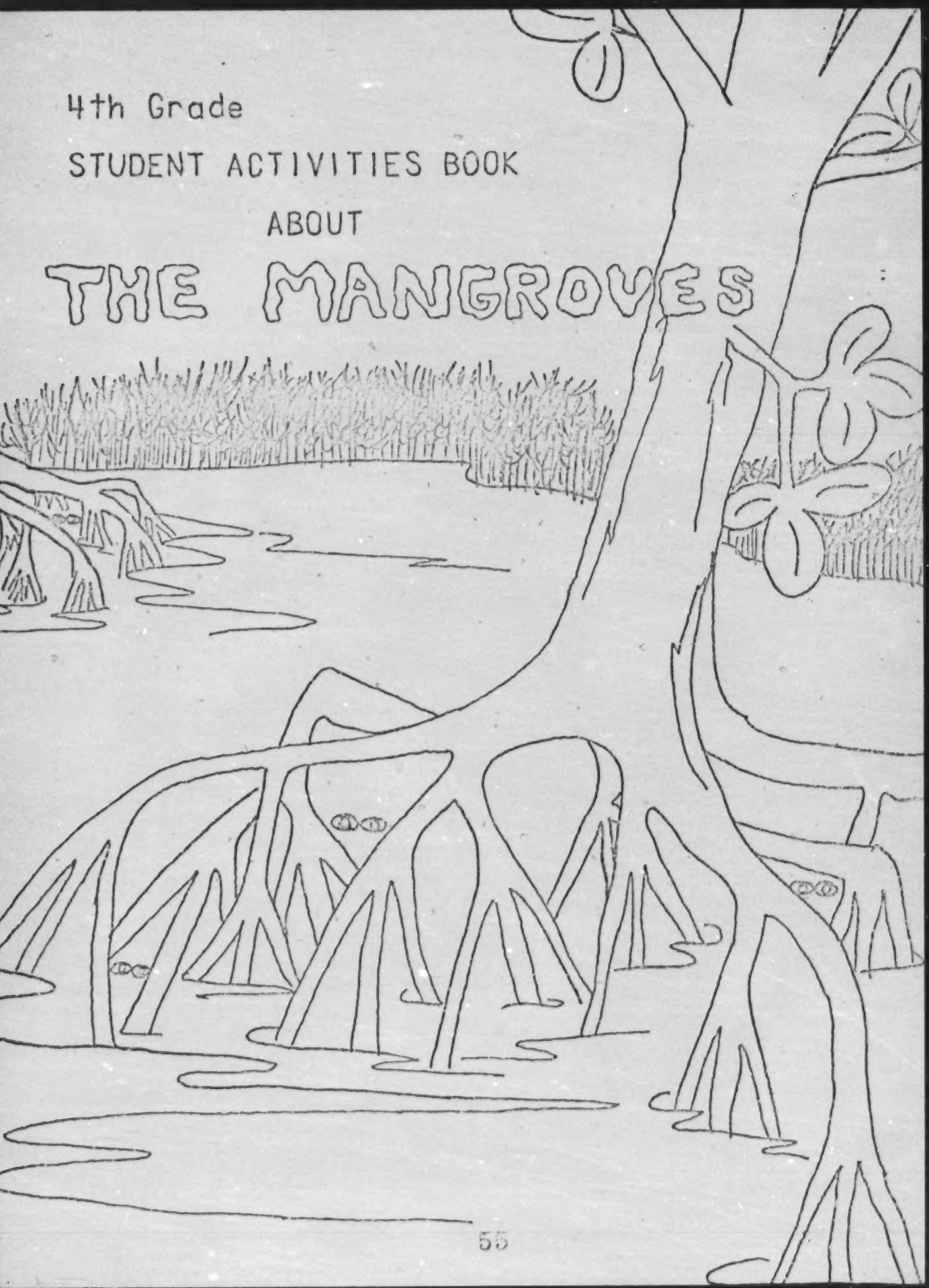
1. detritus, shrimp, fish, pelican
2. algae, snail, crab, man
3. detritus, fiddler crab, snapper, pelican
4. plankton, worm, fish, egret

4th Grade

STUDENT ACTIVITIES BOOK

ABOUT

THE MANGROVES



ORGANISM SCRAMBLE GAME

Each of these scrambled words represents an animal you would find in a mangrove area. Unscramble and spell correctly.

(1) A B C R — CRAB

(2) O K O N S — SNOOK

(3) R E T Y O S — OYSTER

(4) M L A C — CLAM

(5) R G E E T — EGRET

GUESS WHO I AM GAME

(1) I am a tree that has "spider-like" roots which reach down into the water.

Who am I? RED MANGROVE

(2) I am the amount of salt found in the water.

Who am I? SALINITY

(3) I am the area found between low and high tide.

Who am I? INTERTIDAL

(4) I am the the tree that has no roots showing but can be recognized by my notched oval leaves.

Who am I? WHITE MANGROVE

(5) I am a plant that is found growing in water all over the world and come in colors of green, red, and brown.

Who am I? ALGAE

(6) I am a tree which has small breathing roots that stick up out of the soil, and green leaves that have a silvery backing.

Who am I? BLACK MANGROVE

(7) I am a nesting place for birds in the mangrove area.

Who am I? ROOKERY

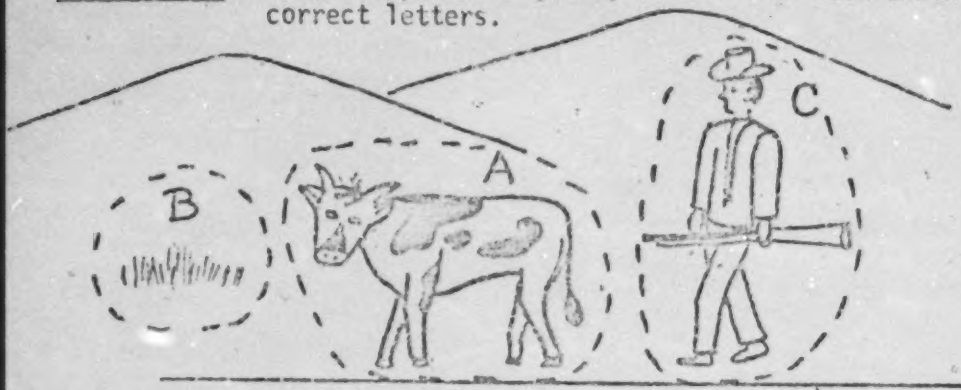
(8) I am a young form of life that doesn't look like my adult parents.

Who am I? LARVA

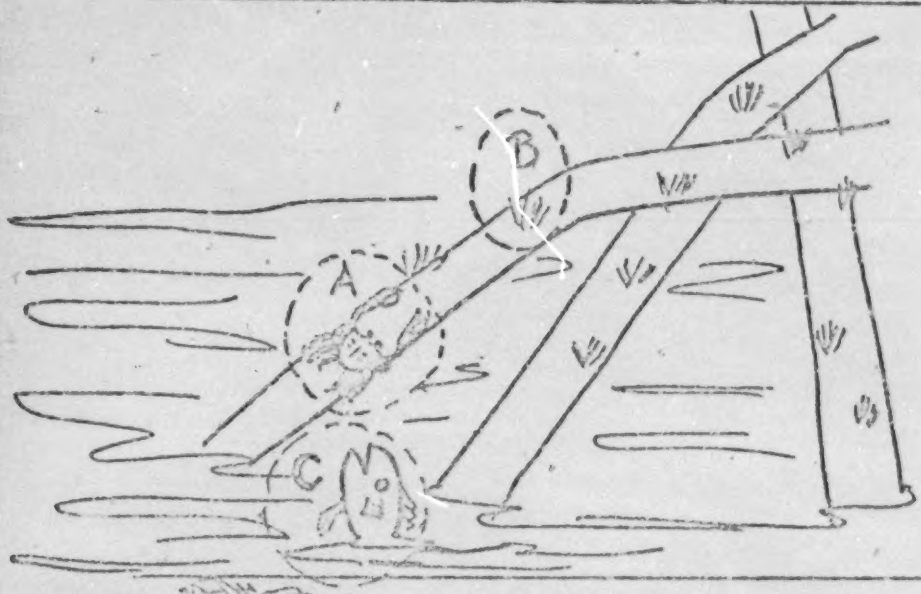
(9) I am the rich dead and decaying matter found in the mangrove area?

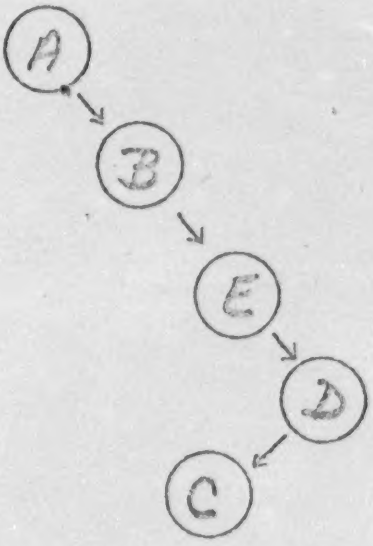
Who am I? DETRITUS

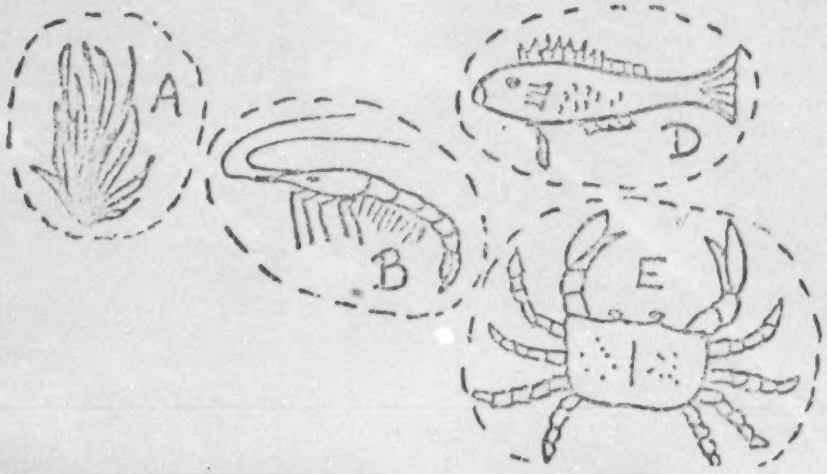
FOOD CHAINS - From the pictures below, fill in the food chains with the correct letters.



B → A → C

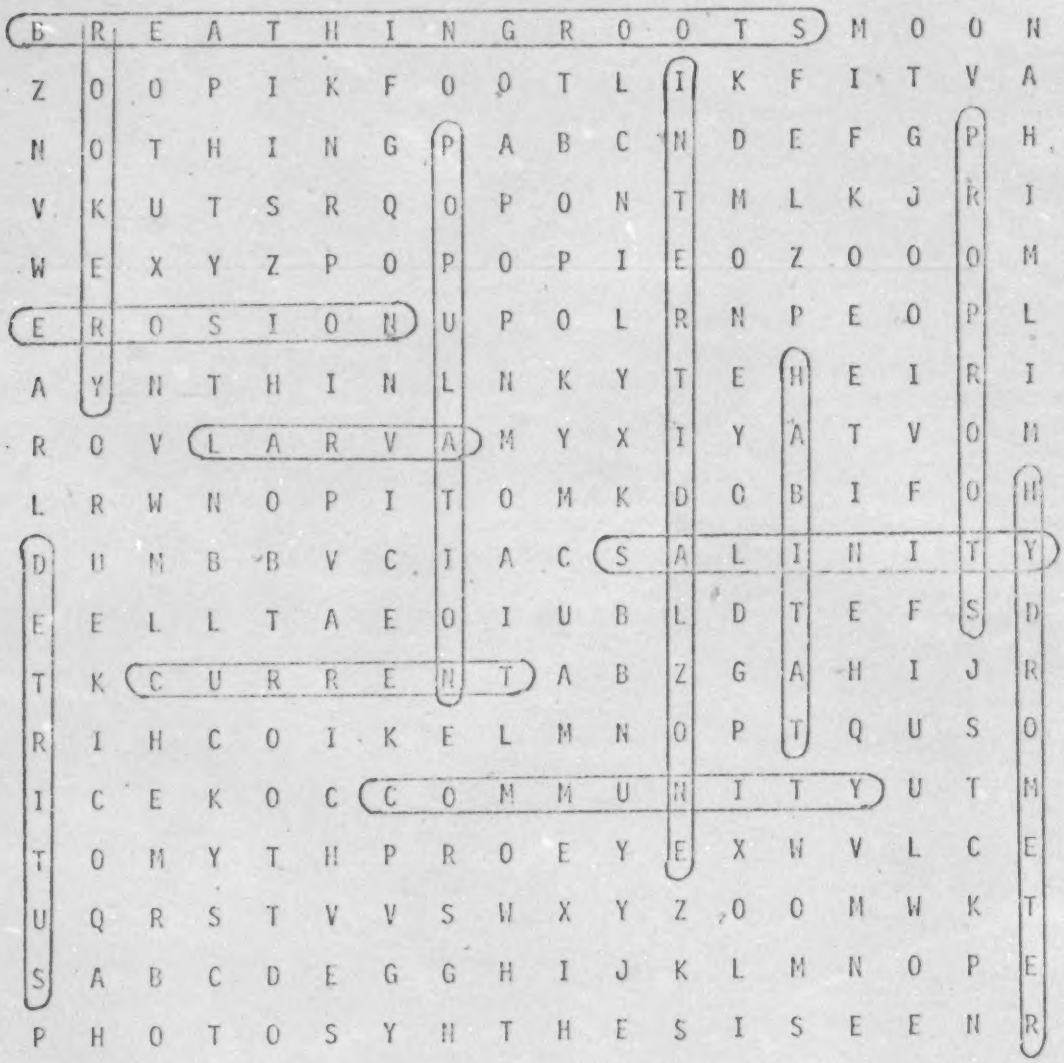






WORD SEARCH

See if you can find and circle vocabulary words dealing with mangroves in the following puzzle. They are listed below for you. All the words read left to right, across the page or top to bottom, down the page.


B R E A T H I N G R O O T S M O O N
Z O O P I K F O O T L I K F I T V A
N O T H I N G P A B C N D E F G P H
V K U T S R Q O P O N T M L K J R I
W E X Y Z P O P O P I E O Z O O O M
E R O S I O N U P O L R N P E O P L
A Y N T H I N L N K Y T E H E I R I
R O V L A R V A M Y X I Y A T V O N
L R W N O P I T O M K D O B I F O H
D U N B B V C J A C S A L I N I T Y
E E L L T A E O I U B L D T E F S D
T K C U R R E N T A B Z G A H I J R
R I H C O I K E L M N O P T Q U S O
I C E K O C C O M M U N I T Y U T N
T O M Y T H P R O E Y E X W V L C E
U Q R S T V V S W X Y Z O O M W K T
S A B C D E G G H I J K L M N O P E
P H O T O S Y N T H E S I S E E N R

COMMUNITY
BREATHING ROOTS
EROSION
LARVA
SALINITY
CURRENT
DETRITUS
ROOKERY
POPULATION
INTERTIDAL ZONE
HABITAT
PROP ROOTS
HYDROMETER

VOCABULARY CROSSWORD CLUES

ACROSS

1. Another word for home
2. The wearing away of the land by waves and wind
3. Plants and animals working and living together
4. Dead and decaying matter found in the mangrove area
5. The amount of salt in the water
6. The movement of water
7. A nesting place for birds

DOWN

1. A floating instrument used to measure the amount of salt in water.
2. What helps hold up the limbs of the red mangrove?
3. Total number of any one kind of animal or plant found in an area
4. "Fingers" found around the black mangroves.
5. An early stage in an organisms life in which it does not resemble its parents.
6. The area between the high tide zone and low tide zone.

VOCABULARY CROSSWORD

1↓ 4 6

1 H A B I T A T
Y
D
2 E R O S I O N
O
3 C O M M u N I T Y
E
T
4 D E T R I T u S
R

2 P
O
P
R
O
O
T

3
P
O
P
u
L
A
T
I
O
N

4
B
R
E
A
T
H
I
N
G
R
O
O
T
S

5 S A L I N I T Y

5
L
A
V
A

6 C u R R E N T

7 R O O K E R Y

6
I
N
T
E
R
T
I
D
A
L
Z
O
N
E

ACROSS

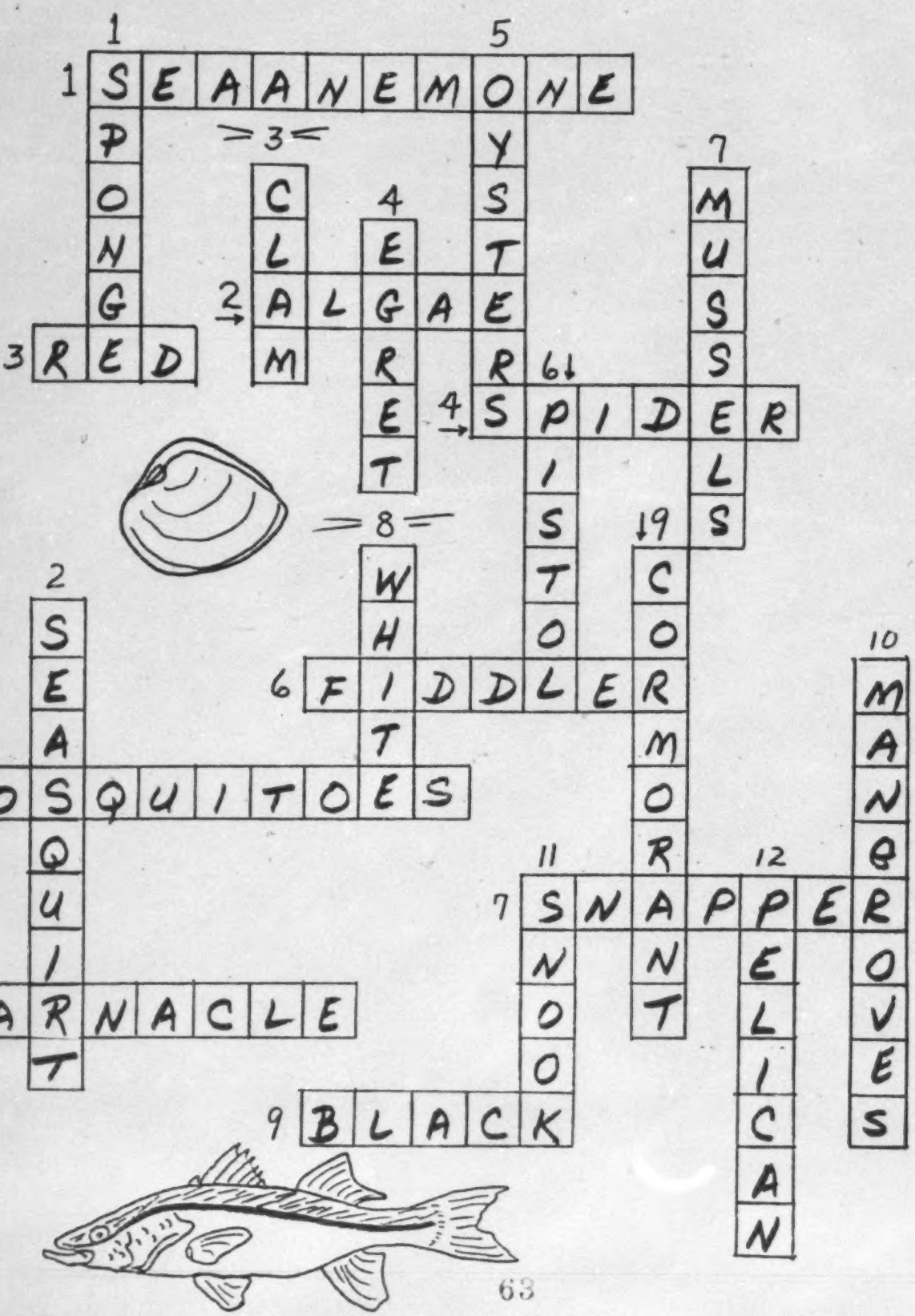
1. An animal that looks like a plant.
2. Water plants found around the world. They can be many colors.
3. Mangrove tree with prop roots.
4. A crab which has long legs, is very slow and cannot swim.
5. Insects whose eggs and young serve as food for fish among the mangroves.
6. Crabs which have one large claw and one tiny claw.
7. A fish with a dark stripe across his eye. His first name is MANGROVE_____.
8. A relative of crabs and shrimp. This animal is always attached to something solid when it is older.
9. The mangrove which has breathing roots.

DOWN

1. A very simple animal whose body is full of tiny holes and canals.
2. An animal that looks very much like a sponge, except its body has only two openings.
3. An animal with two very hard shells and a hard foot to help him move.
4. A large bird found around the mangroves. It is usually white with black legs.
5. A relative of the mussel which is always attached to something solid.
6. The shrimp with one large claw.
7. The relative of the clam that attaches to solid things with tiny threads.
8. The mangrove with the notched leaf blade.
9. The bird that lives in the mangroves and can swim underwater to catch fis
10. A group of salt water trees.
11. What fish lives among the mangroves and has a dark stripe along the side of his body?
12. A large brown bird that lives among the mangroves.

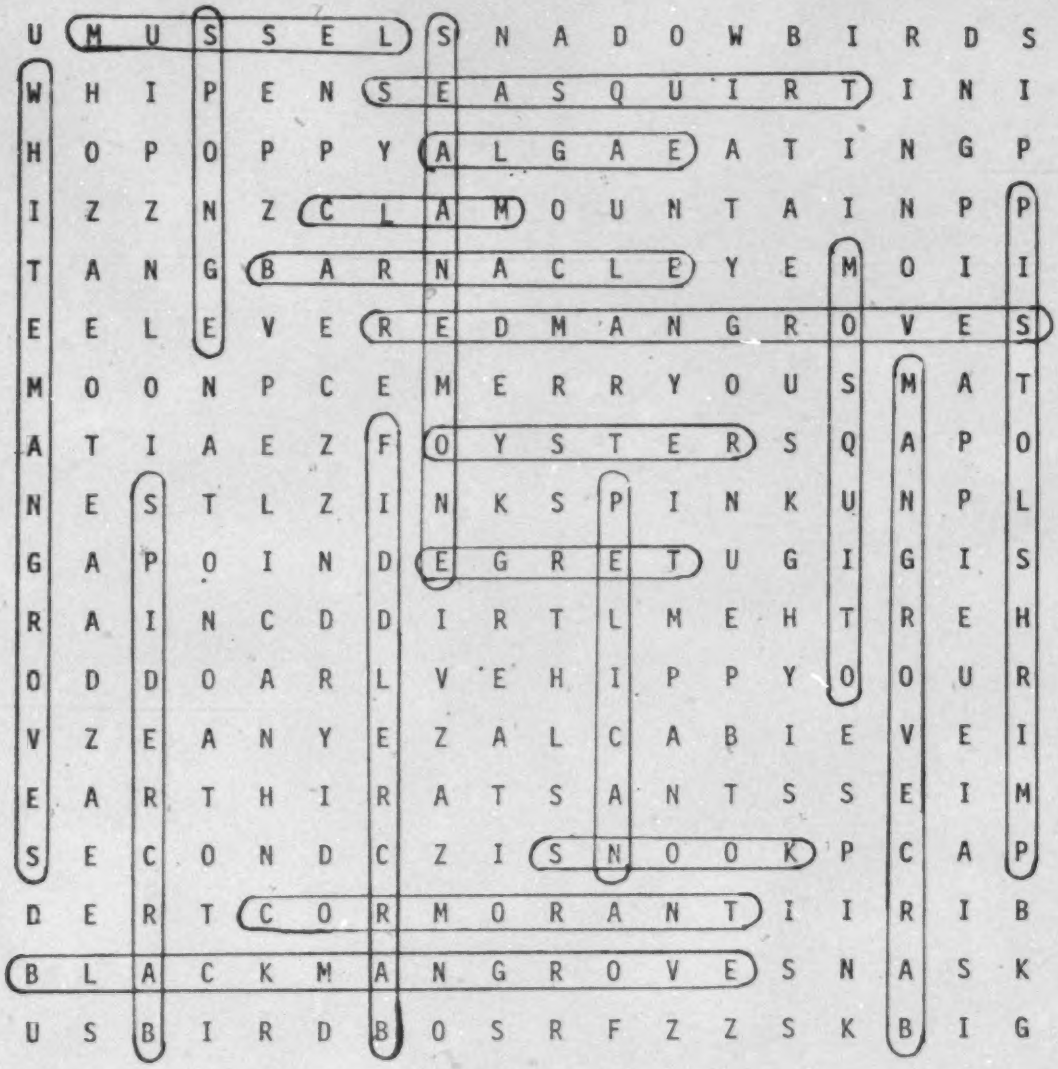
rtin County Schools'
vironmental Studies Center
00 N.E. Indian River Drive
nsen Beach, Fla. 33457

ORGANISMS CROSSWORD



ORGANISM WORD SEARCH

See if you can find and circle 20 organisms that are found around the mangroves. They are listed below and all read left to right, across the page or top to bottom, down the page.


U M U S S E L S N A D O W B I R D S
W H I P E N S E A S Q U I R T I N I
H O P O P P Y A L G A E A T I N G P
I Z Z N Z C L A M O U N T A I N P P
T A N G B A R N A C L E Y E M O I I
E E L E V E R E D M A N G R O V E S
M O O N P C E M E R R Y O U S M A T
A T I A E Z F O Y S T E R S Q A P O
N E S T L Z I N K S P I N K U N P L
G A P O I N D E G R E T U G I G I S
R A I N C D D I R T L M E H T R E H
O D D O A R L V E H I P P Y O O U R
V Z E A N Y E Z A L C A B I E V E I
E A R T H I R A T S A N T S S E I M
S E C O N D C Z I S N O O K P C A P
D E R T C O R M O R A N T I I R I B
B L A C K M A N G R O V E S N A S K
U S B I R D B O S R F Z Z S K B I G

RED MANGROVES
BLACK MANGROVES
WHITE MANGROVES
ALGAE
SPONGE
SEA ANEMONE
OYSTERS
CLAM
MUSSEL
SPIDER CRAB
MANGROVE
FIDDLER CRAB
PISTOL SHRIMP
BARNACLE
SEA SQUIRT
MOSQUITO
MANGROVE CRAB
SNOOK
CORMORANT
EGRET
PELICAN

TEAM # _____ 4th Grade
SCHOOL _____

MANGROVE DATA SHEET

THE MANGROVE COMMUNITY IS MADE UP OF MANY ANIMALS. THESE ANIMALS ARE AFFECTED BY THE WEATHER A LOT LIKE YOU ARE. LET'S RECORD WHAT THE WEATHER IS LIKE TODAY.

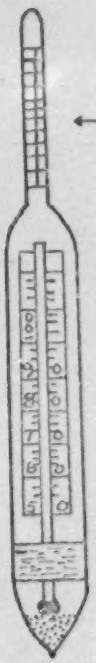
1. TODAY'S DATE:

2. THE WEATHER TODAY IS:

3. WHAT IS THE TEMPERATURE OF THE AIR?

_____ ^{o}F _____ ^{o}C

4. NOW USING THE HYDROMETER KIT, TAKE A SAMPLE OF WATER FROM AROUND THE MANGROVES.



WHAT IS THE HYDROMETER READING?

_____

WHAT IS THE TEMPERATURE OF THE WATER?

_____

NOW USING THE SALINITY CHART - FIND THE SALINITY OF THE WATER

_____

5. WHICH IS WARMER THE AIR OR THE WATER? _____

HOW MUCH WARMER? _____

ORGANISM CHECK LIST

4th Grade

GROUP _____ LOCATION _____

SPONGES

1. _____
2. _____

MOLLUSKS

1. CLAM
2. OYSTER
3. MUSSEL
4. NUDIBRANCH
5. MANGROVE SNAILS
6. _____

ARTHROPODS

1. SHRIMP
2. BLUE CRAB
3. HERMIT CRAB
4. SPIDER CRAB
5. HORSESHOE CRAB
6. FIDDLER CRAB
7. MANGROVE CRAB
8. BARNACLES
9. SPIDERS
10. _____

CHORDATES

1. SEA SQUIRT
2. _____

BIRDS

1. BLUE HERON
2. GULL
3. ELICAN
4. EGRETS
5. CORMORANT
6. OSPREY
7. _____

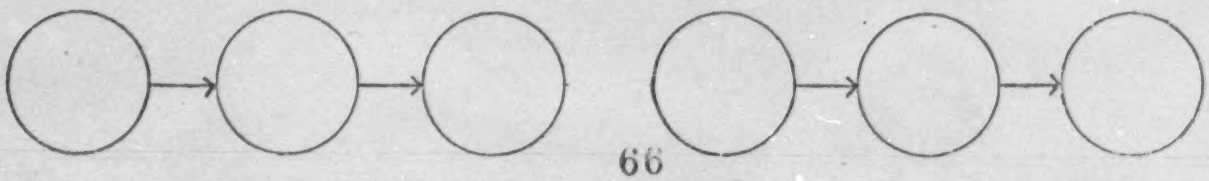
PLANTS

1. RED ALGAE
2. BROWN ALGAE
3. GREEN ALGAE
4. TURTLE GRASS
5. MANATEE GRASS
6. SHOAL GRASS
7. RED MANGROVE
8. BLACK MANGROVE
9. WHITE MANGROVE
10. _____

FISH

1. _____
2. _____
3. _____

NOW USING THE ORGANISMS THAT YOUR GROUP HAS SEEN TODAY DRAW SOME FOOD CHAINS.



4TH GRADE - OVERALL TEST

MANGROVE COMMUNITIES

1. How do prop roots help the land?

   a. cause erosion
   b. prevent erosion
   c. make the water fresh
   d. make the water salty

2. Which of the following animals would probably use the mangroves trees for a rookery?

   a. pelican
   b. raccoon
   c. crab
   d. dragonfly

3. Which of the following is a use for detritus?

   a. some animals eat it
   b. people eat it
   c. it erodes the land
   d. it kills off mangroves

4. The habitat of the mangrove is:

   a. salty water
   b. fresh water
   c. sand dunes
   d. desert

5. Which of the following describes breathing roots of the black mangrove?

   a. they make a good rookery
   b. they help collect detritus
   c. they hold up the limbs of the black mangrove
   d. they make a home for larger snook

6. The roots of which tree provide a home for animals like oysters, sponges and sea squirts?

   a. white mangrove
   b. black mangrove
   c. red mangrove
   d. green mangrove

7. The mosquitoes in the mangrove community are eaten by:

   a. small birds and fish
   b. hermit crabs
   c. algae
   d. detritus

Overall Test

Mangrove Communities (cont'd)

8. Why are birds such as the Egret, Blue Heron, and the Cormorant usually seen around the mangroves?

   a. they eat the leaves of the mangrove trees
   b. they are looking for fish
   c. they are hiding from larger birds
   d. they are eating detritus

9. The roots of which tree help build up new land?

   a. white mangrove
   b. sable palm
   c. australian pine
   d. red mangrove

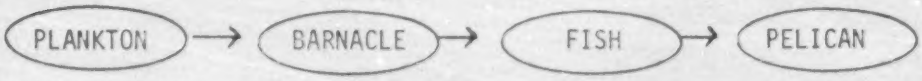
10. What causes the soil around the mangroves to be so rich and black?

   a. salt in the water
   b. wind
   c. detritus
   d. hydrometers

FOOD CHAIN TEST

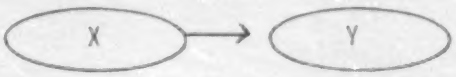
Read all possible answers for each question. Select the correct answer and mark the letter for that answer on your answer sheet.

11. Using the following food chain select the statement which is true.



a. the fish is eaten by the barnacle
b. the plankton is eaten by the fish
c. the barnacle is eaten by the fish
d. the pelican is eaten by the fish

12. In the following food chain what does the (⟶) mean?

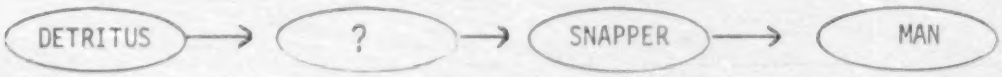


a. X is bigger than Y
b. X is smaller than Y
c. X is eaten by Y
d. Y is eaten by X

13. In a food chain like the one below what does the arrow (⟶) mean?

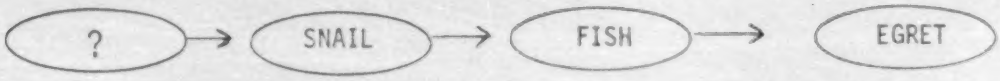
a. energy goes from A to B
b. energy goes from B to A
c. A gets its energy from B
d. A has more energy than B

14. Which of the following organisms belong in the ? to complete the food chain?



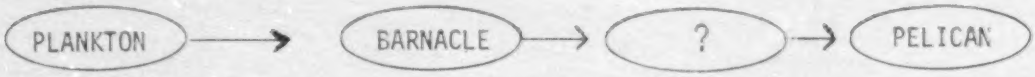
a. pelican
b. sheepshead
c. mangrove
d. shrimp

15. Which of the following organisms belong in the ? to complete the food chain?



a. cormorant
b. shrimp
c. worm
d. algae

16. Which of the following organisms belong in the ? to complete the food chain?



a. man
b. fish
c. clam
d. raccoon

17. Which of the following correctly shows a food chain?

a. cow → man → grass
b. man → cow → grass
c. grass → cow → man
d. man → grass → cow

18. Which of the following correctly shows a food chain?

a. detritus → egret → fish → shrimp
b. egret → fish → shrimp → detritus
c. detritus → shrimp → fish → egret
d. fish → egret → detritus → shrimp

19. Look at the following organisms. Using the letter for each, place them in proper order to make a food chain on your answer sheet.

a. MAN b. DETRITUS c. FISH d. SHRIMP

20. Look at the following organisms. Using the letter for each, place them in proper order to make a food chain on your answer sheet.

a. FIDDLER CRAB b. MANGROVE SNAPPER c. DETRITUS d. PELICAN

VOCABULARY TEST

Select the word which best fits the definition given and record the letter for that word on your answer sheets.

21. The total number of living things of one kind in a certain area is called the:

a. habitat
b. ecosystem
c. community
d. population

22. An instrument you can float in the water to tell the salinity of the water is called a:

a. refractometer
b. photometer
c. hydrometer
d. speedometer

23. Decaying, dead plant and animal matter often found on the river bottom or around the roots of mangroves is called:

a. detritus
b. erosion
c. rookery
d. larva

24. The area in between the high tide line and the low tide line is called the:

a. safety zone
b. low tide zone
c. intertidal zone
d. sandy zone

25. A group of plants and animals living and working together is called a:

a. community
b. population
c. family
d. habitat

26. Long roots which reach from the branches of the red mangroves down into the water are called:

a. breathing roots
b. running roots
c. tap roots
d. prop roots

27. The wearing away of the earth's surface by water or wind is called:

a. corrosion
b. erosion
c. seining
d. turbidity

28. A nesting place for birds is called a:

    a. rookery
    b. population
    c. community
    d. species

29. Short roots which stick up out of the soil around a black mangrove are called:

    a. breathing roots
    b. running roots
    c. tap roots
    d. prop roots

30. An early stage of life for some animals which does not look like the parents is called a:

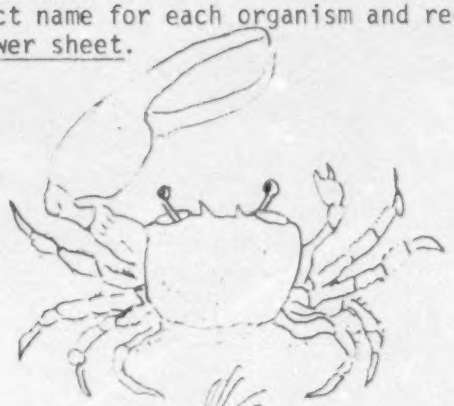
    a. producer
    b. consumer
    c. larva
    d. detritus

ORGANISM TEST

Each question has a drawing of an organism and four choices for the name of that organism.

Select the correct name for each organism and record the letter for that name on your answer sheet.

31.



a. snapping shrimp
b. spider crab
c. fiddler crab
d. blue crab

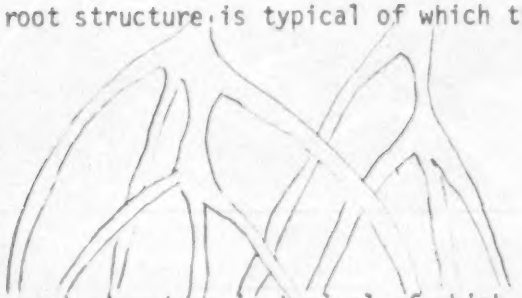
32.

a. barnacle
b. sponge
c. sea anemone
d. sea squirt

33. This is a typical leaf from which tree?

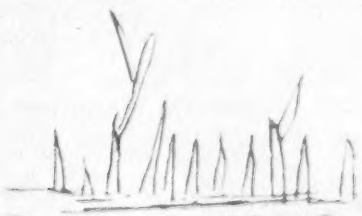
a. red mangrove
b. white mangrove
c. black mangrove
d. button wood

34. The root structure is typical of which tree?



a. red mangrove
b. white mangrove
c. black mangrove
d. button wood

35. This root structure is typical of which tree?



a. red mangrove
b. white mangrove
c. black mangrove
d. button wood

The following are questions about characteristics of organisms found on or around mangroves:

36. Which of the following lays its eggs in water trapped aound the roots of black mangroves?

a. mosquito
b. snook
c. cormorant
d. mangrove snapper

37. Which mangrove tree usually grows in areas that are covered by water only during very high tides?

a. red mangrove
b. black mangrove
c. white mangrove
d. green mangrove

38. Which of the following does a sponge eat?

a. fish
b. plankton
c. shrimp
d. cormorant

39. Which of the following birds is usually white with black legs?

a. pelican
b. cormorant
c. egret
d. blue heron

40. Animals, such as barnacles, oysters, and sea squirts eat:

a. fish
b. plankton
c. prop roots
d. clams

Martin County Schools'
Environmental Studies Center
2900 N.E. Indian River Drive
Jensen Beach, Fla. 33457

Pre/Post # _____

ANSWER SHEET

4th Grade OVERALL Test

Name_____ School_____ Teacher _____

(Mangrove Communities)

1. A (B) C D

2. (A) B C D

3. (A) B C D

4. (A) B C D

5. A (B) C D

6. A B (C) D

7. (A) B C D

8. A (B) C D

9. A B C (D)

10. A B (C) D

(Food Chain)

11. A B (C) D

12. A B (C) D

13. (A) B C D

14. A B C (D)

15. A B C (D)

16. A (B) C D

17. A B (C) D

18. A B (C) D

19. (B) → (D) → (C) → (A)

20. (C) → (A) → (B) → (D)

Pre/Post #_____

ANSWER SHEET

4th Grade OVERALL Test

Name_____ School_____ Teacher_____

(Vocabulary)

21. A B C (D)

22. A B (C) D

23. (A) B C D

24. A B (C) D

25. (A) B C D

26. A B C (D)

27. A (B) C D

28. (A) B C D

29. (A) B C D

30. A B (C) D

(Organisms)

31. A B (C) D

32. (A) B C D

33. A (B) C D

34. (A) B C D

35. A B (C) D

36. (A) B C D

37. A (B) C D

38. A (B) C D

39. A B (C) D

40. A (B) C D

artin County Schools'
nvironmental Studies Center
900 N.E. Indian River Drive
ensen Beach, Florida 33457